



RAILS

RUBY ON RAILS

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About the Tutorial

Ruby on Rails is an extremely productive web application framework written in Ruby by David Heinemeier Hansson. This tutorial gives you a complete understanding on Ruby on Rails.

Audience

This tutorial has been designed for beginners who would like to use the Ruby framework for developing database-backed web applications.

Prerequisites

You need to have a basic knowledge of Ruby and object-oriented programming to understand this tutorial. In addition, you need to be familiar with internet and websites programming in general.

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1. Ruby on Rails – Introduction

What is Ruby?

Before we ride on Rails, let us recapitulate a few points of Ruby, which is the base of Rails.

Ruby is the successful combination of:

- Smalltalk's conceptual elegance,
- Python's ease of use and learning, and
- Perl's pragmatism.

Ruby is

- A high-level programming language.
- Interpreted like Perl, Python, Tcl/Tk.
- Object-oriented like Smalltalk, Eiffel, Ada, Java.

Why Ruby?

Ruby originated in Japan and now it is gaining popularity in US and Europe as well. The following factors contribute towards its popularity:

- Easy to learn
- Open source (very liberal license)
- Rich libraries
- Very easy to extend
- Truly object-oriented
- Less coding with fewer bugs
- Helpful community

Although we have many reasons to use Ruby, there are a few drawbacks as well that you may have to consider before implementing Ruby:

- Performance Issues - Although it rivals Perl and Python, it is still an interpreted language and we cannot compare it with high-level programming languages like C or C++.
- Threading model – Ruby does not use native threads. Ruby threads are simulated in the VM rather than running as native OS threads.

Sample Ruby Code

Here is a sample Ruby code to print "Hello Ruby"

```
# The Hello Class
class Hello
  def initialize( name )
    @name = name.capitalize
  end

  def salute
    puts "Hello #{@name}!"
  end
end

# Create a new object
h = Hello.new("Ruby")

# Output "Hello Ruby!"
h.salute
```

Embedded Ruby

Ruby provides a program called ERb (Embedded Ruby), written by *Seki Masatoshi*. ERb allows you to put Ruby codes inside an HTML file. ERb reads along, word for word, and then at a certain point, when it encounters a Ruby code embedded in the document, it starts executing the Ruby code.

You need to know only two things to prepare an ERb document:

- If you want some Ruby code executed, enclose it between **<% and %>**.
- If you want the result of the code execution to be printed out, as a part of the output, enclose the code between **<%= and %>**.

Here's an example. Save the code in erbdemo.rb file. Note that a Ruby file will have an extension **.rb**:

```
<% page_title = "Demonstration of ERb" %>
<% salutation = "Dear programmer," %>
<html>
<head>
<title><%= page_title %></title>
</head>
<body>
```

```
<p><%= salutation %></p>
<p>This is an example of how ERb fills out a template.</p>
</body>
</html>
```

Now, run the program using the command-line utility erb.

```
c:\ruby\>erb erbdemo.rb
```

This will produce the following result:

```
<html>
<head>
<title>Demonstration of ERb</title>
</head>
<body>
<p>Dear programmer,</p>
<p>This is an example of how ERb fills out a template.</p>
</body>
</html>
```

What is Rails?

- An extremely productive web-application framework.
- Written in Ruby by David Heinemeier Hansson.
- You could develop a web application at least ten times faster with Rails than you could with a typical Java framework.
- An open source Ruby framework for developing database-backed web applications.
- Your code and database schema are the configuration!
- No compilation phase required.

Full Stack Framework

- Includes everything needed to create a database-driven web application, using the Model-View-Controller pattern.
- Being a full-stack framework means all the layers are built to work seamlessly together with less code.
- Requires fewer lines of code than other frameworks.

Convention over Configuration

- Rails shuns configuration files in favor of conventions, reflection, and dynamic runtime extensions.
- Your application code and your running database already contain everything that Rails needs to know!

Rails Strengths

Rails is packed with features that make you more productive, with many of the following features building on one other.

Metaprogramming: Other frameworks use extensive code generation from scratch. Metaprogramming techniques use programs to write programs. Ruby is one of the best languages for metaprogramming, and Rails uses this capability well. Rails also uses code generation but relies much more on metaprogramming for the heavy lifting.

Active Record: Rails introduces the Active Record framework, which saves objects to the database. The Rails version of the Active Record discovers the columns in a database schema and automatically attaches them to your domain objects using metaprogramming.

Convention over configuration: Most web development frameworks for .NET or Java force you to write pages of configuration code. If you follow the suggested naming conventions, Rails doesn't need much configuration.

Scaffolding: You often create temporary code in the early stages of development to help get an application up quickly and see how major components work together. Rails automatically creates much of the scaffolding you'll need.

Built-in testing: Rails creates simple automated tests you can then extend. Rails also provides supporting code called harnesses and fixtures that make test cases easier to write and run. Ruby can then execute all your automated tests with the rake utility.

Three environments: Rails gives you three default environments: development, testing, and production. Each behaves slightly differently, making your entire software development cycle easier. For example, Rails creates a fresh copy of the Test database for each test run.

2. Ruby on Rails – Installation

To develop a web application using Ruby on Rails Framework, you need to install the following software –

- Ruby
- The Rails Framework
- A Web Server
- A Database System

We assume that you already have installed a Web Server and a Database System on your computer. You can use the WEBrick Web Server, which comes with Ruby. Most websites however use Apache or lightTPD web servers in production.

Rails works with many database systems, including MySQL, PostgreSQL, SQLite, Oracle, DB2 and SQL Server. Please refer to a corresponding Database System Setup manual to set up your database.

Let's look at the installation instructions for Rails on Windows and Linux.

Rails Installation on Windows

Follow the steps given below for installing Ruby on Rails.

Step 1: Check Ruby Version

First, check if you already have Ruby installed. Open the command prompt and type **ruby -v**. If Ruby responds, and if it shows a version number at or above 2.2.2, then type **gem --version**. If you don't get an error, skip **Install Ruby** step. Otherwise, we'll install a fresh Ruby.

Step 2: Install Ruby

If Ruby is not installed, then download an installation package from rubyinstaller.org. Follow the **download** link, and run the resulting installer. This is an exe file **rubyinstaller-2.2.2.x.exe** and will be installed in a single click. It's a very small package, and you'll get RubyGems as well along with this package. Please check the **Release Notes** for more detail.

RubyInstaller
for Windows

About Download Help Contribute

The easy way to install Ruby on Windows

This is a **self-contained Windows-based installer** that includes the **Ruby language**, an execution environment, important **documentation**, and more...

[Download](#) [Add-ons](#)

Latest News

RubyInstaller 2.0.0-p645, 2.1.6 and 2.2.2 released
These new releases of Ruby address a security issue (CVE-2015-1855). 2.1.6 and 2.2.2 also address some bugs and fixes. Upgrading to those versions is recommended. You can find the links to those archives in the download section.
April 16, 2015 [Read full article](#)

RubyInstaller 2.2.1 released
The RubyInstaller distribution of Ruby 2.2.1 was just released. Check out the downloads section for the installers and binary packages.
March 06, 2015 [Read full article](#)

Extras

Online Ruby Programming Course
If you're new to Ruby, check out this online course from The Pragmatic Studio to learn all the fundamentals of object-oriented programming with Ruby.

Online Rails Programming Course
If you're looking to create Ruby on Rails web apps, you'll learn how to build a complete Rails 4 app step-by-step in this online course also from The Pragmatic Studio.

Step 3: Install Rails

install Rails: With Rubygems loaded, you can install all of Rails and its dependencies using the following command through the command line –

```
C:\> gem install rails
```

```
C:\Windows\system32\cmd.exe
C:\>gem install rails
Fetching: thread_safe-0.3.5.gem (100%)
Successfully installed thread_safe-0.3.5
Fetching: tzinfo-1.2.2.gem (100%)
Successfully installed tzinfo-1.2.2
Fetching: i18n-0.7.0.gem (100%)
Successfully installed i18n-0.7.0
Fetching: activesupport-4.2.3.gem (100%)
Successfully installed activesupport-4.2.3
Fetching: rails-deprecated_sanitizer-1.0.3.gem (100%)
Successfully installed rails-deprecated_sanitizer-1.0.3
Fetching: mini_portile-0.6.2.gem (100%)
Successfully installed mini_portile-0.6.2
Fetching: nokogiri-1.6.6.2-x64-mingw32.gem (100%)
Nokogiri is built with the packaged libraries: libxml2-2.9.2, libxslt-1.1.28, zlib-1.2.8, libiconv-1.14.
Successfully installed nokogiri-1.6.6.2-x64-mingw32
Fetching: rails-dom-testing-1.0.6.gem (100%)
Successfully installed rails-dom-testing-1.0.6
Fetching: loofah-2.0.2.gem (100%)
Successfully installed loofah-2.0.2
Fetching: rails-html-sanitizer-1.0.2.gem (100%)
Successfully installed rails-html-sanitizer-1.0.2
Fetching: erubis-2.7.0.gem (100%)
```

Note: The above command may take some time to install all dependencies. Make sure you are connected to the internet while installing gems dependencies.

Step 4: Check Rails Version

Use the following command to check the rails version.

```
tp> rails -v
```

Output

```
Rails 4.2.4
```

Congratulations! You are now on Rails over Windows.

Rails Installation on Linux

We are installing Ruby On Rails on Linux using **rbenv**. It is a lightweight Ruby Version Management Tool. The **rbenv** provides an easy installation procedure to manage various versions of Ruby, and a solid environment for developing Ruby on Rails applications.

Follow the steps given below to install Ruby on Rails using rbenv tool.

Step 1: Install Prerequisite Dependencies

First of all, we have to install **git - core** and some ruby dependences that help to install Ruby on Rails. Use the following command for installing Rails dependencies using **yum**.

```
tp> sudo yum install -y git-core zlib zlib-devel gcc-c++ patch readline
readline-devel libyaml-devel libffi-devel openssl-devel make bzip2 autoconf
automake libtool bison curl sqlite-devel
```

Step 2: Install rbenv

Now we will install rbenv and set the appropriate environment variables. Use the following set of commands to get rbenv for git repository.

```
tp> git clone git://github.com/sstephenson/rbenv.git .rbenv
tp> echo 'export PATH="$HOME/.rbenv/bin:$PATH"' >> ~/.bash_profile
tp> echo 'eval "$($(rbenv init -))"' >> ~/.bash_profile
tp> exec $SHELL

tp> git clone git://github.com/sstephenson/ruby-build.git
~/.rbenv/plugins/ruby-build
tp> echo 'export PATH="$HOME/.rbenv/plugins/ruby-build/bin:$PATH"' >>
~/.bash_profile
tp> exec $SHELL
```

Step 3: Install Ruby

Before installing Ruby, determine which version of Ruby you want to install. We will install Ruby 2.2.3. Use the following command for installing Ruby.

```
tp> rbenv install -v 2.2.3
```

Use the following command for setting up the current Ruby version as default.

```
tp> rbenv global 2.2.3
```

Use the following command to verify the Ruby version.

```
tp> ruby -v
```

Output

```
ruby 2.2.3p173 (2015-08-18 revivion 51636) [X86_64-linux]
```

Ruby provides a keyword **gem** for installing the supported dependencies; we call them **gems**. If you don't want to install the documentation for Ruby-gems, then use the following command.

```
tp> echo "gem: --no-document" > ~/.gemrc
```

Thereafter, it is better to install the Bundler gem, because it helps to manage your application dependencies. Use the following command to install bundler gem.

```
tp> gem install bundler
```

Step 4: Install Rails

Use the following command for installing Rails version 4.2.4.

```
tp> install rails -v 4.2.4
```

Use the following command to make Rails executable available.

```
tp> rbenv rehash
```

Use the following command for checking the rails version.

```
tp> rails -v
```

Output

```
tp> Rails 4.2.4
```

Ruby on Rails framework requires JavaScript Runtime Environment (Node.js) to manage the features of Rails. Next, we will see how we can use Node.js to manage Asset Pipeline which is a Rails feature.

Step 5: Install JavaScript Runtime

Let us install Node.js from the Yum repository. We will take Node.js from EPEL yum repository. Use the following command to add the EPEL package to the yum repository.

```
tp> sudo yum -y install epel-release
```

Use the following command for installing the Node.js package.

```
tp> sudo yum install nodejs
```

Congratulations! You are now on Rails over Linux.

Step 6: Install Database

By default, Rails uses sqlite3, but you may want to install MySQL, PostgreSQL, or other RDBMS. This is optional; if you have the database installed, then you may skip this step and it is not mandatory that you have a database installed to start the rails server. For this tutorial, we are using PostgreSQL database. Therefore use the following commands to install PostgreSQL.

```
tp> sudo yum install postgresql-server postgresql-contrib
```

Accept the prompt, by responding with a **y**. Use the following command to create a PostgreSQL database cluster.

```
tp> sudo postgresql-setup initdb
```

Use the following command to start and enable PostgreSQL.

```
tp> sudo systemctl start postgresql  
tp> sudo systemctl enable postgresql
```

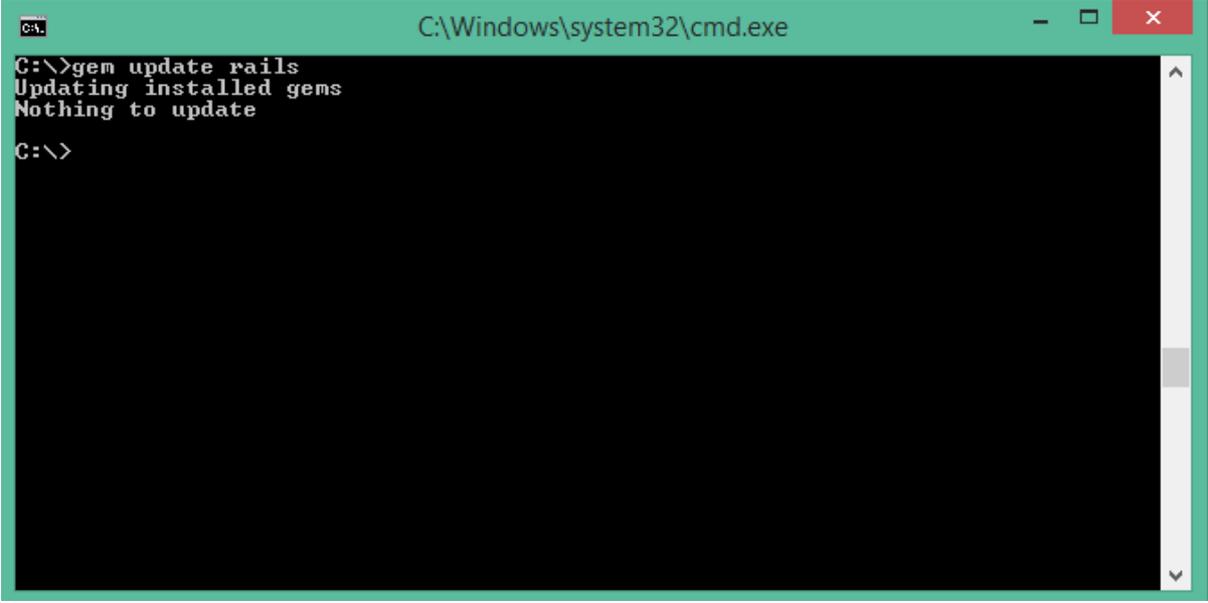
Keeping Rails Up-to-Date

Assuming you have installed Rails using RubyGems, keeping it up-to-date is relatively easy. We can use the same command in both Windows and Linux platform. Use the following command –

```
tp> gem update rails
```

Output

The following screenshot shows a Windows command prompt. The Linux terminal also provides the same output.



```
C:\Windows\system32\cmd.exe
C:\>gem update rails
Updating installed gems
Nothing to update
C:\>
```

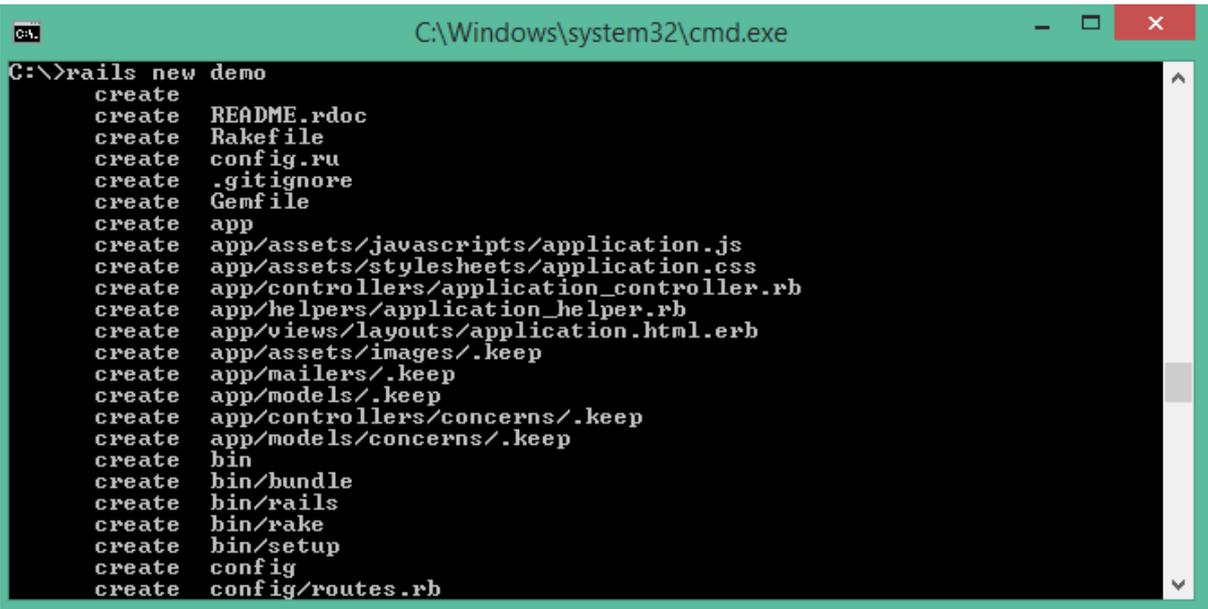
This will automatically update your Rails installation. The next time you restart your application, it will pick up this latest version of Rails. While using this command, make sure you are connected to the internet.

Installation Verification

You can verify if everything is set up according to your requirements or not. Use the following command to create a demo project.

```
tp> rails new demo
```

Output



```
C:\Windows\system32\cmd.exe
C:\>rails new demo
create
create  README.rdoc
create  Rakefile
create  config.ru
create  .gitignore
create  Gemfile
create  app
create  app/assets/javascripts/application.js
create  app/assets/stylesheets/application.css
create  app/controllers/application_controller.rb
create  app/helpers/application_helper.rb
create  app/views/layouts/application.html.erb
create  app/assets/images/.keep
create  app/mailers/.keep
create  app/models/.keep
create  app/controllers/concerns/.keep
create  app/models/concerns/.keep
create  bin
create  bin/bundle
create  bin/rails
create  bin/rake
create  bin/setup
create  config
create  config/routes.rb
```

It will generate a demo rail project; we will discuss about it later. Currently we have to check if the environment is set up or not. Next, use the following command to run WEBrick web server on your machine.

```
tp> cd demo
tp> rails server
```

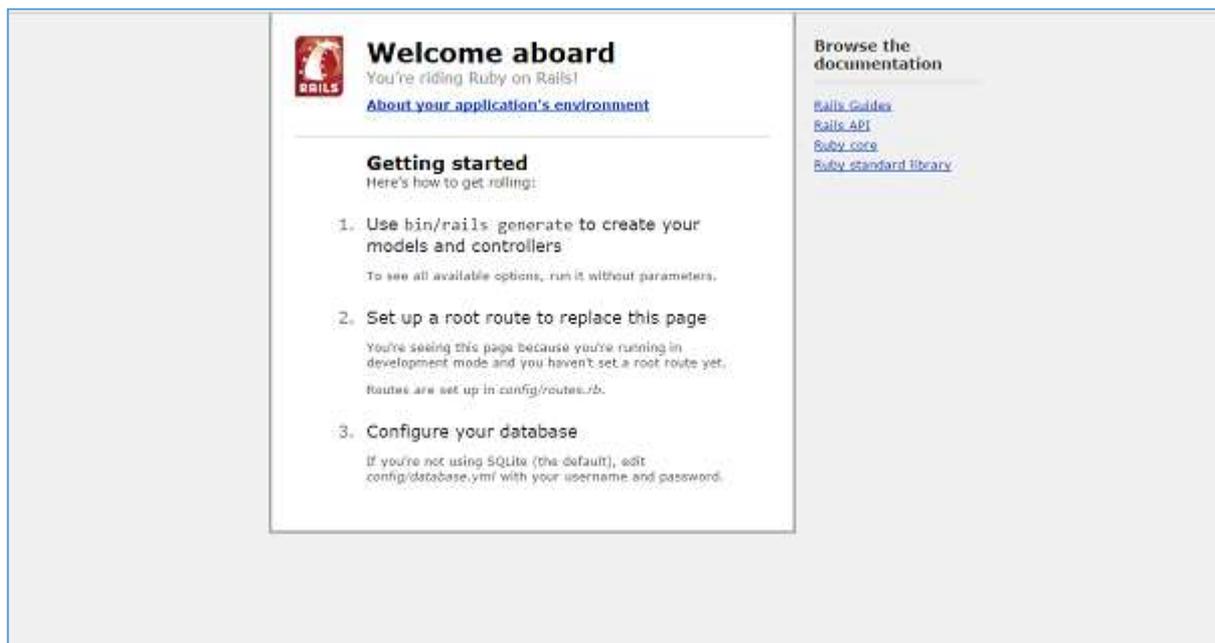
It will generate auto-code to start the server

```
$ rails server
DL is deprecated, please use Fiddle
=> Booting WEBrick
=> Rails 4.2.3 application starting in development on http://localhost:3000
=> Run `rails server -h` for more startup options
=> Ctrl-C to shutdown server
```

Now open your browser and type the following –

```
http://localhost:3000
```

It should display a message, something like, "Welcome aboard" or "Congratulations".



Welcome aboard
You're riding Ruby on Rails!

[About your application's environment](#)

Getting started
Here's how to get rolling:

- 1. Use bin/rails generate to create your models and controllers**
To see all available options, run it without parameters.
- 2. Set up a root route to replace this page**
You're seeing this page because you're running in development mode and you haven't set a root route yet. Routes are set up in config/routes.rb.
- 3. Configure your database**
If you're not using SQLite (the default), edit config/database.yml with your username and password.

Browse the documentation

- [Rails Guides](#)
- [Rails API](#)
- [Ruby core](#)
- [Ruby standard library](#)

3. Ruby on Rails – Framework

A framework is a program, set of programs, and/or code library that writes most of your application for you. When you use a framework, your job is to write the parts of the application that make it do the specific things you want.

When you set out to write a Rails application, leaving aside the configuration and other housekeeping chores, you have to perform three primary tasks:

- **Describe and model your application's domain:** The domain is the universe of your application. The domain may be a music store, a university, a dating service, an address book, or a hardware inventory. So here you have to figure out what's in it, what entities exist in this universe and how the items in it relate to each other. This is equivalent to modeling a database structure to keep the entities and their relationship.
- **Specify what can happen in this domain:** The domain model is static; you have to make it dynamic. Addresses can be added to an address book. Musical scores can be purchased from music stores. Users can log in to a dating service. Students can register for classes at a university. You need to identify all the possible scenarios or actions that the elements of your domain can participate in.
- **Choose and design the publicly available views of the domain:** At this point, you can start thinking in Web-browser terms. Once you've decided that your domain has students, and that they can register for classes, you can envision a welcome page, a registration page, and a confirmation page, etc. Each of these pages or views shows the user how things stand at a certain point.

Based on the above three tasks, Ruby on Rails deals with a Model/View/Controller (MVC) framework.

Ruby on Rails MVC Framework

The **M**odel **V**iew **C**ontroller principle divides the work of an application into three separate but closely cooperative subsystems.

Model (ActiveRecord)

It maintains the relationship between the objects and the database and handles validation, association, transactions, and more.

This subsystem is implemented in ActiveRecord library, which provides an interface and binding between the tables in a relational database and the Ruby program code that manipulates database records. Ruby method names are automatically generated from the field names of database tables.

View (ActionView)

It is a presentation of data in a particular format, triggered by a controller's decision to present the data. They are script-based template systems like JSP, ASP, PHP, and very easy to integrate with AJAX technology.

This subsystem is implemented in ActionView library, which is an Embedded Ruby (ERb) based system for defining presentation templates for data presentation. Every Web connection to a Rails application results in the displaying of a view.

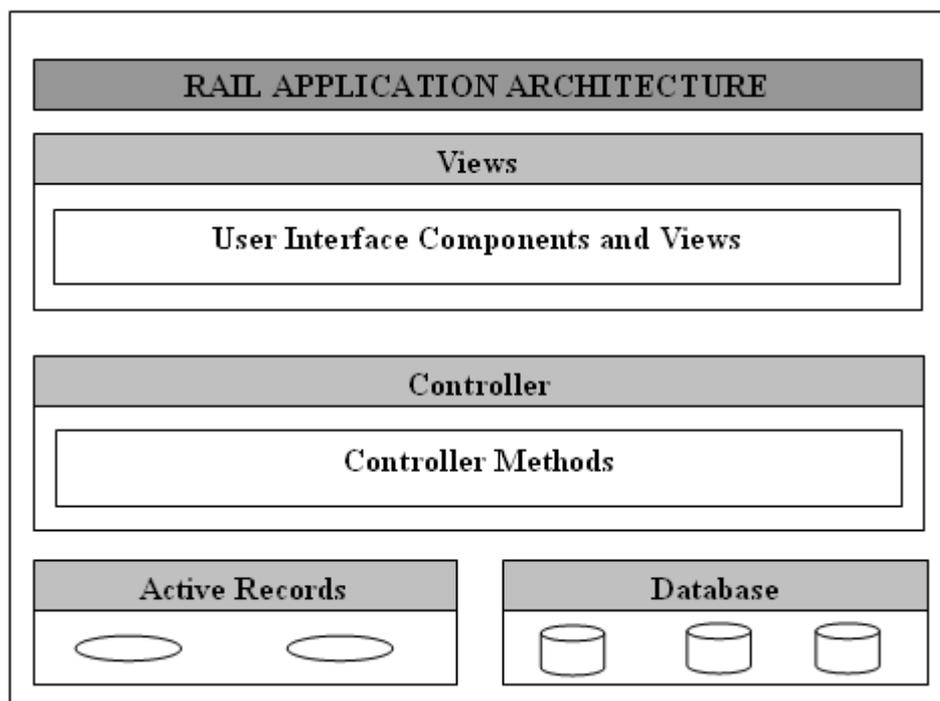
Controller (ActionController)

The facility within the application that directs traffic, on the one hand, querying the models for specific data, and on the other hand, organizing that data (searching, sorting, massaging it) into a form that fits the needs of a given view.

This subsystem is implemented in ActionController, which is a data broker sitting between ActiveRecord (the database interface) and ActionView (the presentation engine).

Pictorial Representation of MVC Framework

Given below is a pictorial representation of Ruby on Rails Framework:



Directory Representation of MVC Framework

Assuming a standard, default installation over Linux, you can find them like this:

```
tp> cd /usr/local/lib/ruby/gems/1.8/gems
tp> ls
```

You will see subdirectories including (but not limited to) the following:

- actionpack-x.y.z
- activerecord-x.y.z
- rails-x.y.z

Over a windows installation, you can find them like this:

```
tp>cd ruby\lib\ruby\gems\1.8\gems
ruby\lib\ruby\gems\1.8\gems\>dir
```

You will see subdirectories including (but not limited to) the following:

- actionpack-x.y.z
- activerecord-x.y.z
- rails-x.y.z

ActionView and ActionController are bundled together under ActionPack.

ActiveRecord provides a range of programming techniques and shortcuts for manipulating data from an SQL database. ActionController and ActionView provides facilities for manipulating and displaying that data. Rails ties it all together.

4. Ruby on Rails – Directory Structure

When you use the Rails helper script to create your application, it creates the entire directory structure for the application. Rails knows where to find things it needs within this structure, so you don't have to provide any input.

Here is a top-level view of a directory tree created by the helper script at the time of application creation. Except for minor changes between releases, every Rails project will have the same structure, with the same naming conventions. This consistency gives you a tremendous advantage; you can quickly move between Rails projects without relearning the project's organization.

To understand this directory structure, let's use the **demo** application created in the Installation chapter. It can be created using a simple helper command **C:\ruby\> rails demo**.

Now, go into the demo application root directory as follows:

```
tp> cd demo
ruby\demo> dir
```

You will find a directory structure as follows:

```
demo/
.... /app
..... /controller
..... /helpers
..... /models
..... /views
..... /layouts
.... /components
.... /config
.... /db
.... /doc
.... /lib
.... /log
.... /public
.... /script
.... /test
.... /tmp
.... /vendor
```

README Rakefile

Now let's explain the purpose of each directory

- **app:** It organizes your application components. It's got subdirectories that hold the view (views and helpers), controller (controllers), and the backend business logic (models).
- **app/controllers:** The controllers subdirectory is where Rails looks to find the controller classes. A controller handles a web request from the user.
- **app/helpers:** The helpers subdirectory holds any helper classes used to assist the model, view, and controller classes. This helps to keep the model, view, and controller code small, focused, and uncluttered.
- **app/models:** The models subdirectory holds the classes that model and wrap the data stored in our application's database. In most frameworks, this part of the application can grow pretty messy, tedious, verbose, and error-prone. Rails makes it dead simple!
- **app/view:** The views subdirectory holds the display templates to fill in with data from our application, convert to HTML, and return to the user's browser.
- **app/view/layouts:** Holds the template files for layouts to be used with views. This models the common header/footer method of wrapping views. In your views, define a layout using the `<tt>layout:default</tt>` and create a file named `default.rhtml`. Inside `default.rhtml`, call `<% yield %>` to render the view using this layout.
- **components:** This directory holds components, tiny self-contained applications that bundle model, view, and controller.
- **config:** This directory contains the small amount of configuration code that your application will need, including your database configuration (in `database.yml`), your Rails environment structure (`environment.rb`), and routing of incoming web requests (`routes.rb`). You can also tailor the behavior of the three Rails environments for test, development, and deployment with files found in the `environments` directory.
- **db:** Usually, your Rails application will have model objects that access relational database tables. You can manage the relational database with scripts you create and place in this directory.
- **doc:** Ruby has a framework, called RubyDoc, that can automatically generate documentation for code you create. You can assist RubyDoc with comments in your code. This directory holds all the RubyDoc-generated Rails and application documentation.
- **lib:** You'll put libraries here, unless they explicitly belong elsewhere (such as vendor libraries).
- **log:** Error logs go here. Rails creates scripts that help you manage various error logs. You'll find separate logs for the server (`server.log`) and each Rails environment (`development.log`, `test.log`, and `production.log`).

- **public:** Like the public directory for a web server, this directory has web files that don't change, such as JavaScript files (public/javascripts), graphics (public/images), stylesheets (public/stylesheets), and HTML files (public).
- **script:** This directory holds scripts to launch and manage the various tools that you'll use with Rails. For example, there are scripts to generate code (generate) and launch the web server (server).
- **test:** The tests you write and those that Rails creates for you, all goes here. You'll see a subdirectory for mocks (mocks), unit tests (unit), fixtures (fixtures), and functional tests (functional).
- **tmp:** Rails uses this directory to hold temporary files for intermediate processing.
- **vendor:** Libraries provided by third-party vendors (such as security libraries or database utilities beyond the basic Rails distribution) go here.

Apart from these directories, there will be two files available in demo directory.

- **README:** This file contains a basic detail about Rail Application and description of the directory structure explained above.
- **Rakefile:** This file is similar to Unix Makefile, which helps with building, packaging and testing the Rails code. This will be used by rake utility supplied along with the Ruby installation.

5. Ruby on Rails – Examples

Subsequent chapters are based on the example given in this chapter. In this chapter, we will create a simple but operational online library system for holding and managing the books.

This application has a basic architecture and will be built using two ActiveRecord models to describe the types of data that is stored:

- Books, which describes an actual listing.
- Subject, which is used to group books together.

Workflow for Creating Rails Applications

A recommended workflow for creating Rails Application is as follows:

1. Use the rails command to create the basic skeleton of the application.
2. Create a database on the MySQL server to hold your data.
3. Configure the application to know where your database is located and the login credentials for it.
4. Create Rails Active Records (Models), because they are the business objects you'll be working with in your controllers.
5. Generate Migrations that simplify the creating and maintaining of database tables and columns.
6. Write Controller Code to put a life in your application.
7. Create Views to present your data through User Interface.

So, let us start with creating our library application.

Creating an Empty Rails Web Application

Rails is both a runtime web application framework and a set of helper scripts that automate many of the things you do when developing a web application. In this step, we will use one such helper script to create the entire directory structure and the initial set of files to start our Library System application.

- Go into ruby installation directory to create your application.
- Run the following command to create a skeleton for library application.

```
tp> rails library
```

This will create a subdirectory for the library application containing a complete directory tree of folders and files for an empty Rails application. Check a complete directory structure of the application. Check **Rails Directory Structure** for more detail.

Most of our development work will be creating and editing files in the **library/app** subdirectories. Here's a quick rundown of how to use them:

- The *controllers* subdirectory is where Rails looks to find controller classes. A controller handles a web request from the user.
- The *views* subdirectory holds the display templates to fill in with data from our application, convert to HTML, and return to the user's browser.
- The *models* subdirectory holds the classes that model and wrap the data stored in our application's database. In most frameworks, this part of the application can grow pretty messy, tedious, verbose, and error-prone. Rails makes it dead simple.
- The *helpers* subdirectory holds any helper classes used to assist the model, view, and controller classes. This helps to keep the model, view, and controller code small, focused, and uncluttered.

Starting Web Server

Rails web application can run under virtually any web server, but the most convenient way to develop a Rails web application is to use the built-in WEBrick web server. Let's start this web server and then browse to our empty library application:

This server will be started from the application directory as follows. It runs on port number 3000.

```
tp> cd ruby\library
ruby\library\> ruby script/server
```

This will start your WEBrick web server.

Now open your browser and browse to <http://127.0.0.1:3000>. If everything is gone fine, then you should see a greeting message from WEBrick, otherwise there is something wrong with your setting.

What is Next?

The next chapter explains how to create databases for your application and what is the configuration required to access these created databases.

Further, we will see what Rails Migration is and how it is used to maintain database tables.

6. Ruby on Rails – Database Setup

Before starting with this chapter, make sure your database server is up and running. Ruby on Rails recommends to create three databases - a database each for development, testing, and production environment. According to convention, their names should be:

- library_development
- library_production
- library_test

You should initialize all three of them and create a user and password for them with full read and write privileges. We are using the **root** user ID for our application.

Database Setup for MySQL

In MySQL, a console session in which you do this looks something like:

```
mysql> create database library_development;
Query OK, 1 row affected (0.01 sec)

mysql> grant all privileges on library_development.*
to 'root'@'localhost' identified by 'password';
Query OK, 0 rows affected (0.00 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)
```

You can do the same thing for two more databases **library_production** and **library_test**.

Configuring database.yml

At this point, you need to let Rails know about the user name and password for the databases. You do this in the file **database.yml**, available in the **C:\ruby\library\config** subdirectory of Rails Application you created. This file has live configuration sections for MySQL databases. In each of the sections you use, you need to change the username and password lines to reflect the permissions on the databases you've created.

When you finish, it should look something like:

```
development:
  adapter: mysql
  database: library_development
  username: root
  password: [password]
  host: localhost
test:
  adapter: mysql
  database: library_test
  username: root
  password: [password]
  host: localhost
production:
  adapter: mysql
  database: library_production
  username: root
  password: [password]
  host: localhost
```

Database Setup for PostgreSQL

By default, PostgreSQL does not provide any users. We have to create new users. Use the following command to create a user with the name **rubyuser**.

```
tp> sudo -u postgres createuser rubyuser -s
```

If you want to create a password for the new user, then use the following command.

```
tp> sudo -u postgres psql
postgres=# \password rubyuser
```

Use the following command for creating a database **library_development**.

```
postgres=# CREATE DATABASE library_development OWNER rubyuser;

CREATE DATABASE
```

Use the following command for creating a database **library_production**.

```
postgres=# CREATE DATABASE library_production OWNER rubyuser;

CREATE DATABASE
```

Use the following command for creating a database **library_test**.

```
postgres=# CREATE DATABASE library_test OWNER rubyuser;

CREATE DATABASE
```

Press **Ctrl+D** to terminate PostgreSQL.

Configuring database.yml

At this point, you need to let Rails know the username and password for the databases. You do this in the file **database.yml**, available in the **library\config** subdirectory of Rails Application you created. This file has live configuration sections for PostgreSQL databases. In each of the sections, you need to change the username and password lines to reflect the permissions on the databases you've created.

When you finish, it should look as follows:

```
default: &default
  adapter: postgresql
  encoding: unicode

development:
  adapter: postgresql
  encoding: unicode
  database: library_development
  username: rubyuser
  password: <Password for rubyuser>

test:
  adapter: postgresql
  encoding: unicode
  database: library_test
  username: rubyuser
  password: <Password for rubyuser>

production:
  adapter: postgresql
```

```
encoding: unicode
database: library_production
username: rubyuser
password: <Password for rubyuser>
```

What is Next?

The next two chapters explain how to model your database tables and how to manage those using Rails Migrations.

7. Ruby on Rails – Active Records

Rails Active Record is the Object/Relational Mapping (ORM) layer supplied with Rails. It closely follows the standard ORM model, which is as follows:

- tables map to classes,
- rows map to objects and
- columns map to object attributes.

Rails Active Records provide an interface and binding between the tables in a relational database and the Ruby program code that manipulates database records. Ruby method names are automatically generated from the field names of database tables.

Each Active Record object has CRUD (**C**reate, **R**ead, **U**ppdate, and **D**eleate) methods for database access. This strategy allows simple designs and straightforward mappings between database tables and application objects.

Translating A Domain Model into SQL

Translating a domain model into SQL is generally straightforward, as long as you remember that you have to write Rails-friendly SQL. In practical terms, you have to follow certain rules:

- Each entity (such as book) gets a table in the database named after it, but in the plural (books).
- Each such entity-matching table has a field called *id*, which contains a unique integer for each record inserted into the table.
- Given entity x and entity y, if entity y belongs to entity x, then table y has a field called x_id.
- The bulk of the fields in any table store the values for that entity's simple properties (anything that's a number or a string).

Creating Active Record Files

To create the Active Record files for our entities for library application, introduced in the previous chapter, issue the following command from the top level of the application directory.

```
library\> ruby script/generate model Book
library\> ruby script/generate model Subject
```

You're telling the generator to create models called Book and Subject to store instances of books and subjects. Notice that you are capitalizing Book and Subject and using the singular form. This is a Rails paradigm that you should follow each time you create a model.

When you use the generate tool, Rails creates the actual model file that holds all the methods unique to the model and the business rules you define, a unit test file for performing test-driven development, a sample data file (called fixtures) to use with the unit tests, and a Rails migration that makes creating database tables and columns easy.

Apart from creating many other files and directories, this will create files named **book.rb** and **subject.rb** containing a skeleton definition in the **app/models** directory.

Content available in book.rb:

```
class Book < ActiveRecord::Base
end
```

Content available in subject.rb:

```
class Subject < ActiveRecord::Base
end
```

Creating Associations between Models

When you have more than one model in your rails application, you would need to create connection between those models. You can do this via associations. Active Record supports three types of associations:

- **one-to-one:** A one-to-one relationship exists when one item has exactly one of another item. For example, a person has exactly one birthday or a dog has exactly one owner.
- **one-to-many:** A one-to-many relationship exists when a single object can be a member of many other objects. For instance, one subject can have many books.
- **many-to-many:** A many-to-many relationship exists when the first object is related to one or more of a second object, and the second object is related to one or many of the first object.

You indicate these associations by adding declarations to your models: `has_one`, `has_many`, `belongs_to`, and `has_and_belongs_to_many`.

Now, you need to tell Rails what relationships you want to establish within the library data system. To do so, modify `book.rb` and `subject.rb` to look like this:

```
class Book < ActiveRecord::Base
  belongs_to :subject
end
```

We have used a singular subject in the above example, because one Book can belong to a single Subject.

```
class Subject < ActiveRecord::Base
  has_many :books
end
```

We have used plural books here, because one subject can have multiple books.

Implementing Validations

The implementation of validations is done in a Rails model. The data you are entering into the database is defined in the actual Rails model, so it only makes sense to define what valid data entails in the same location.

Open **book.rb** and put the following validations:

```
class Book < ActiveRecord::Base
  belongs_to :subject
  validates_presence_of :title
  validates_numericality_of :price, :message=>"Error Message"
end
```

- **validates_presence_of** - protects "NOT NULL" fields against missing user input.
- **validates_numericality_of** - prevents the user, entering non numeric data.

Besides the validations mentioned above, there are other common validations. Check **Rails Quick Guide**.

What is Next?

In the next chapter, we will learn Rails Migration, which allows you to use Ruby to define changes to your database schema, making it possible to use a version control system to keep things synchronized with the actual code.

8. Ruby on Rails – Migrations

Rails Migration allows you to use Ruby to define changes to your database schema, making it possible to use a version control system to keep things synchronized with the actual code.

This has many uses, including:

- Teams of developers - If one person makes a schema change, the other developers just need to update and run "rake migrate".
- Production servers - Run "rake migrate" when you roll out a new release to bring the database up to date as well.
- Multiple machines - If you develop on both a desktop and a laptop, or in more than one location, migrations can help you keep them all synchronized.

What Can Rails Migration Do?

- `create_table(name, options)`
- `drop_table(name)`
- `rename_table(old_name, new_name)`
- `add_column(table_name, column_name, type, options)`
- `rename_column(table_name, column_name, new_column_name)`
- `change_column(table_name, column_name, type, options)`
- `remove_column(table_name, column_name)`
- `add_index(table_name, column_name, index_type)`
- `remove_index(table_name, column_name)`

Migrations support all the basic data types: string, text, integer, float, datetime, timestamp, time, date, binary and Boolean:

- **string** - for small data types such as a title.
- **text** - for longer pieces of textual data, such as the description.
- **integer** - for whole numbers.
- **float** - for decimals.
- **datetime and timestamp** - store the date and time into a column.
- **date and time** - store either the date only or time only.
- **binary** - for storing data such as images, audio, or movies.
- **Boolean** - for storing true or false values.

Valid column options are:

- **limit** (:limit => "50")
- **default** (:default => "blah")
- **null** (:null => false implies NOT NULL)

NOTE: The activities done by Rails Migration can be done using any front-end GUI or directly on SQL prompt, but Rails Migration makes all those activities very easy.

See the **Rails API** for details on these.

Create the Migrations

Here is the generic syntax for creating a migration:

```
application> ruby script/generate migration table_name
```

This will create the file db/migrate/001_table_name.rb. A migration file contains the basic Ruby syntax that describes the data structure of a database table.

NOTE: Before running the migration generator, it is recommended to clean the existing migrations generated by model generators.

We will create two migrations corresponding to our three tables: **books and subjects**.

```
tp> cd library
library> ruby script/generate migration books
library> ruby script/generate migration subjects
```

Notice that you are using lowercase for book and subject and plural form while creating migrations. This is a Rails paradigm that you should follow each time you create a Migration.

Edit the Code:

Go to db/migrate subdirectory of your application and edit each file one by one using any simple text editor.

Modify 001_books.rb as follows:

The ID column will be created automatically, so don't do it here as well.

```
class Books < ActiveRecord::Migration
  def self.up
    create_table :books do |t|
      t.column :title, :string, :limit => 32, :null => false
      t.column :price, :float
      t.column :subject_id, :integer
      t.column :description, :text
    end
  end
end
```

```

    t.column :created_at, :timestamp
  end
end

def self.down
  drop_table :books
end
end

```

The method **self.up** is used when migrating to a new version, **self.down** is used to roll back any changes if needed. At this moment, the above script will be used to create **books** table.

Modify 002_subjects.rb as follows:

```

class Subjects < ActiveRecord::Migration
  def self.up
    create_table :subjects do |t|
      t.column :name, :string
    end
    Subject.create :name => "Physics"
    Subject.create :name => "Mathematics"
    Subject.create :name => "Chemistry"
    Subject.create :name => "Psychology"
    Subject.create :name => "Geography"
  end

  def self.down
    drop_table :subjects
  end
end

```

The above script will be used to create **subjects** table and will create five records in the subjects table.

Run the Migration

Now that you have created all the required migration files. It is time to execute them against the database. To do this, go to a command prompt and go to the library directory in which the application is located, and then type **rake migrate** as follows:

```
library> rake db:migrate
```

This will create a "schema_info" table if it doesn't exist, which tracks the current version of the database - each new migration will be a new version, and any new migrations will be run until your database is at the current version.

Rake is a Ruby build program similar to Unix *make* program that Rails takes advantage of, to simplify the execution of complex tasks such as updating a database's structure etc.

Running Migrations for Production and Test Databases

If you would like to specify what Rails environment to use for the migration, use the `RAILS_ENV` shell variable.

For example:

```
library> export RAILS_ENV=production
library> rake db:migrate
library> export RAILS_ENV=test
library> rake db:migrate
library> export RAILS_ENV=development
library> rake db:migrate
```

NOTE: In Windows, use "set RAILS_ENV=production" instead of *export* command.

What is Next?

Now, we have our database and the required tables available. In the two subsequent chapters, we will explore two important components called Controller (ActionController) and View (ActionView).

- Creating Controllers (Action Controller).
- Creating Views (Action View).

9. Ruby on Rails – Controller

The Rails controller is the logical center of your application. It coordinates the interaction between the user, the views, and the model. The controller is also a home to a number of important ancillary services.

- It is responsible for routing external requests to internal actions. It handles people-friendly URLs extremely well.
- It manages caching, which can give applications orders-of-magnitude performance boosts.
- It manages helper modules, which extend the capabilities of the view templates without bulking up their code.
- It manages sessions, giving users the impression of an ongoing interaction with our applications.

The process for creating a controller is very easy, and it's similar to the process we've already used for creating a model. We will create just one controller here:

```
library\> ruby script/generate controller Book
```

Notice that you are capitalizing Book and using the singular form. This is a Rails paradigm that you should follow each time you create a controller.

This command accomplishes several tasks, of which the following are relevant here:

- It creates a file called `app/controllers/book_controller.rb`

If you look at `book_controller.rb`, you will find it as follows:

```
class BookController < ApplicationController
end
```

Controller classes inherit from *ApplicationController*, which is the other file in the controllers folder: **application.rb**.

The *ApplicationController* contains code that can be run in all your controllers and it inherits from Rails *ActionController::Base* class.

You don't need to worry with the *ApplicationController* as of yet, so let's just define a few method stubs in **book_controller.rb**. Based on your requirement, you could define any number of functions in this file.

Modify the file to look like the following and save your changes. Note that it is up to you what name you want to give to these methods, but better to give relevant names.

```
class BookController < ApplicationController
  def list
  end
```

```
def show
end

def new
end

def create
end

def edit
end

def update
end

def delete
end

end
```

Now let us implement all the methods one by one.

Implementing the list Method

The list method gives you a printout of all the books in the database. This functionality will be achieved by the following lines of code.

```
def list
  @books = Book.all
end
```

The `@books = Book.all` line in the list method tells Rails to search the books table and store each row it finds in the `@books` instance object.

Implementing the show Method

The show method displays only further details on a single book. This functionality will be achieved by the following lines of code.

```
def show
  @book = Book.find(params[:id])
end
```

The show method's `@book = Book.find(params[:id])` line tells Rails to find only the book that has the id defined in `params[:id]`.

The `params` object is a container that enables you to pass values between method calls. For example, when you're on the page called by the list method, you can click a link for a specific book, and it passes the id of that book via the `params` object so that show can find the specific book.

Implementing the new Method

The new method lets Rails know that you will create a new object. So just add the following code in this method.

```
def new
  @book = Book.new
  @subjects = Subject.all
end
```

The above method will be called when you will display a page to the user to take user input. Here second line grabs all the subjects from the database and puts them in an array called @subjects.

Implementing the create Method

Once you take user input using HTML form, it is time to create a record into the database. To achieve this, edit the create method in the book_controller.rb to match the following:

```
def create
  @book = Book.new(book_params)

  if @book.save
    redirect_to :action => 'list'
  else
    @subjects = Subject.all
    render :action => 'new'
  end
end

def book_params
  params.require(:books).permit(:title, :price, :subject_id, :description)
end
```

The first line creates a new instance variable called @book that holds a Book object built from the data, the user submitted. The **book_params** method is used to collect all the fields from object:**books**. The data was passed from the new method to create using the params object.

The next line is a conditional statement that redirects the user to the **list** method if the object saves correctly to the database. If it doesn't save, the user is sent back to the new method. The redirect_to method is similar to performing a meta refresh on a web page: it automatically forwards you to your destination without any user interaction.

Then `@subjects = Subject.all` is required in case it does not save data successfully and it becomes similar case as with new option.

Implementing the edit Method

The edit method looks nearly identical to the show method. Both methods are used to retrieve a single object based on its id and display it on a page. The only difference is that the show method is not editable.

```
def edit
  @book = Book.find(params[:id])
  @subjects = Subject.all
end
```

This method will be called to display data on the screen to be modified by the user. The second line grabs all the subjects from the database and puts them in an array called `@subjects`.

Implementing the update Method

This method will be called after the edit method, when the user modifies a data and wants to update the changes into the database. The update method is similar to the create method and will be used to update existing books in the database.

```
def update
  @book = Book.find(params[:id])

  if @book.update_attributes(book_param)
    redirect_to :action => 'show', :id => @book
  else
    @subjects = Subject.all
    render :action => 'edit'
  end
end

def book_param
  params.require(:book).permit(:title, :price, :subject_id, :description)
end
```

The `update_attributes` method is similar to the `save` method used by create but instead of creating a new row in the database, it overwrites the attributes of the existing row.

Then `@subjects = Subject.all` line is required in case it does not save the data successfully, then it becomes similar to edit option.

Implementing the delete Method

If you want to delete a record from the database, then you will use this method. Implement this method as follows.

```
def delete
  Book.find(params[:id]).destroy
  redirect_to :action => 'list'
end
```

The first line finds the classified based on the parameter passed via the params object and then deletes it using the destroy method. The second line redirects the user to the list method using a redirect_to call.

Additional Methods to Display Subjects

Assume you want to give a facility to your users to browse all the books based on a given subject. So, you can create a method inside book_controller.rb to display all the subjects. Assume the method name is **show_subjects**:

```
def show_subjects
  @subject = Subject.find(params[:id])
end
```

Finally your **book_controller.rb** file will look as follows:

```
class BooksController < ApplicationController

  def list
    @books = Book.all
  end

  def show
    @book = Book.find(params[:id])
  end

  def new
    @book = Book.new
    @subjects = Subject.all
  end

  def book_params
```

```
    params.require(:books).permit(:title, :price, :subject_id, :description)
  end

  def create
    @book = Book.new(book_params)

    if @book.save
      redirect_to :action => 'list'
    else
      @subjects = Subject.all
      render :action => 'new'
    end
  end

  def edit
    @book = Book.find(params[:id])
    @subjects = Subject.all
  end

  def book_param
    params.require(:book).permit(:title, :price, :subject_id, :description)
  end

  def update
    @book = Book.find(params[:id])

    if @book.update_attributes(book_param)
      redirect_to :action => 'show', :id => @book
    else
      @subjects = Subject.all
      render :action => 'edit'
    end
  end

  def delete
    Book.find(params[:id]).destroy
  end
end
```

```
    redirect_to :action => 'list'
  end

  def show_subjects
    @subject = Subject.find(params[:id])
  end

end
```

Now, save your controller file.

What is Next?

You have created almost all the methods, which will work on backend. Next, we will define routes (URLs) for actions.

10. Ruby on Rails – Routes

The routing module provides URL rewriting in native Ruby. It's a way to redirect incoming requests to controllers and actions. It replaces the `mod_rewrite` rules. Best of all, Rails' Routing works with any web server. Routes are defined in `app/config/routes.rb`.

Think of creating routes as drawing a map for your requests. The map tells them where to go based on some predefined pattern:

```
Rails.application.routes.draw do
  Pattern 1 tells some request to go to one place
  Pattern 2 tell them to go to another
  ...
end
```

Example

Let us consider our library management application contains a controller called `BookController`. We have to define the routes for those actions which are defined as methods in the `BookController` class.

Open `routes.rb` file in `library/config/` directory and edit it with the following content.

```
Rails.application.routes.draw do
  get 'books/list'
  get 'books/new'
  post 'books/create'
  patch 'books/update'
  get 'books/list'
  get 'books/show'
  get 'books/edit'
  get 'books/delete'
  get 'books/update'
  get 'books/show_subjects'
end
```

The routes.rb file defines the actions available in the applications and the type of action such as get, post, and patch.

Use the following command to list all your defined routes, which are useful for tracking down routing problems in your application, or giving you a good overview of the URLs in an application you're trying to get familiar with.

```
library> rake routes
```

What is Next?

Next, we will create the code to generate screens to display data and to take input from the user.

11. Ruby on Rails – Views

A Rails View is an ERb program that shares data with controllers through mutually accessible variables.

If you look in the `app/views` directory of the library application, you will see one subdirectory for each of the controllers, we have created: `book`. Each of these subdirectories was created automatically when the same-named controller was created with the generate script.

Rails let's you know that you need to create the view file for each new method. Each method you define in the controller needs to have a corresponding erb file, with the same name as the method, to display the data that the method is collecting.

So let's create view files for all the methods we have defined in the `book_controller.rb`. While executing these views, simultaneously check these actions are applicable into the database or not.

Creating View File for list Method

Create a file called `list.html.erb` using your favorite text editor and save it to `app/views/book`. After creating and saving the file, refresh your web browser. You should see a blank page; if you don't, check the spelling of your file and make sure that it is exactly the same as your controller's method.

Now, display the actual content. Let us put the following code into `list.html.erb`.

```
<% if @books.blank? %>
<p>There are not any books currently in the system.</p>
<% else %>
<p>These are the current books in our system</p>

<ul id="books">
  <% @books.each do |c| %>
    <li><%= link_to c.title, {:action => 'show', :id => c.id} -%></li>
  <% end %>
</ul>

<% end %>
<p><%= link_to "Add new Book", {:action => 'new' }%></p>
```

The code to be executed is to check whether the `@books` array has any objects in it. The `.blank?` method returns true if the array is empty, and false if it contains any objects. This `@books` object was created in controller inside the list method.

The code between the `<%= %>` tags is a **link_to** method call. The first parameter of `link_to` is the text to be displayed between the `<a>` tags. The second parameter is what action is called when the link is clicked. In this case, it is the `show` method. The final parameter is the id of the book that is passed via the `params` object.

Now, try refreshing your browser and you should get the following screen because we don't have any book in our library.



Creating View File for new Method

Till now, we don't have any book in our library. We have to create few books in the system. So, let us design a view corresponding to the **new** method defined in the `book_controller.rb`.

Create a file called `new.html.erb` using your favorite text editor and save it to `app/views/book`. Add the following code to the `new.html.erb` file.

```
<h1>Add new book</h1>
<%= form_tag :action => 'create' do %>
<p><label for="book_title">Title</label>:
<%= text_field 'books', 'title' %></p>
<p><label for="book_price">Price</label>:
<%= text_field 'books', 'price' %></p>
<p><label for="book_subject_id">Subject</label>:
<%= collection_select(:books, :subject_id, @subjects, :id, :name, prompt: true)
%></p>
<p><label for="book_description">Description</label><br/>
<%= text_area 'books', 'description' %></p>
<%= submit_tag "Create" %>
<% end -%>
<%= link_to 'Back', {:action => 'list'} %>
```

Here **form_tag** method interprets the Ruby code into a regular HTML <form> tag using all the information supplied to it. This tag, for example, outputs the following HTML:

```
<form action="/book/create" method="post">
```

Next method is **text_field** that outputs an <input> text field. The parameters for text_field are object and field name. In this case, the object is *book* and the name is *title*.

Rails method called **collection_select**, creates an HTML select menu built from an array, such as the @books one. There are five parameters, which are as follows:

- **:book** - The object you are manipulating. In this case, it's a book object.
- **:subject_id** - The field that is populated when the book is saved.
- **@books** - The array you are working with.
- **:id** - The value that is stored in the database. In terms of HTML, this is the <option> tag's value parameter.
- **:name**- The output that the user sees in the pull-down menu. This is the value between the <option> tags.

The next used is **submit_tag**, which outputs an <input> button that submits the form. Finally, there is the **end** method that simply translates into </form>.

Go to your browser and visit <http://localhost:3000/book/new>. This will give you the following screen.

The screenshot shows a Mozilla Firefox browser window with the address bar displaying <http://localhost:3000/book/new>. The page content is as follows:

Add new book

Title :

Price :

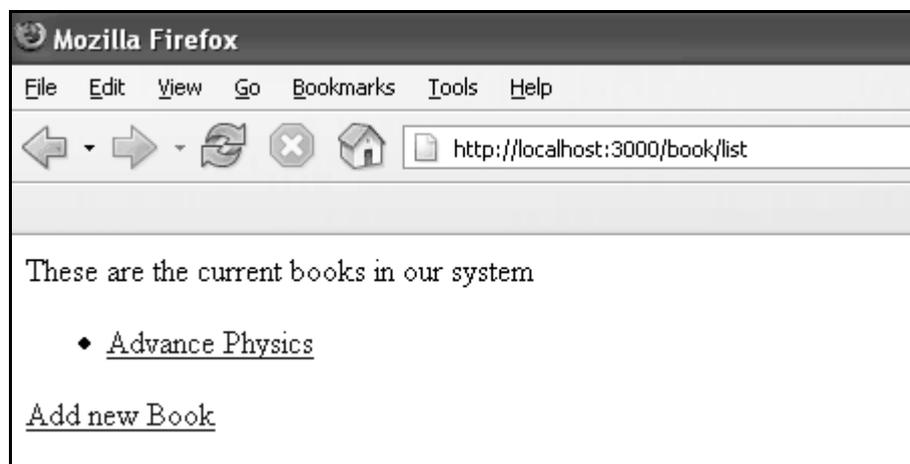
Subject: ▼

Description

Enter some data in this form and then click the Create button. Here I have added the following details into the fields-

Title: Advance Physics
Price: 390
Subject: Physics
Description: This is test to create new book

When you click the **Create** button, it will call the **create** method, which does not need any view because this method is using either **list** or **new** methods to view the results. So, when you click the Create button, the data should submit successfully and redirect you to the list page, in which you now have a single item listed as follows:



If you click the link, you should see another Template is missing error, since you haven't created the template file for show method yet.

Creating View File for show Method

This method will display the complete detail about any book available in the library. Create a show.html.erb file under app/views/book and populate it with the following code:

```
<h1><%= @book.title %></h1>

<p><strong>Price: </strong> $<%= @book.price %><br />
<strong>Subject :</strong> <%= @book.subject.name %><br />
<strong>Created Date:</strong> <%= @book.created_at %><br />
</p>

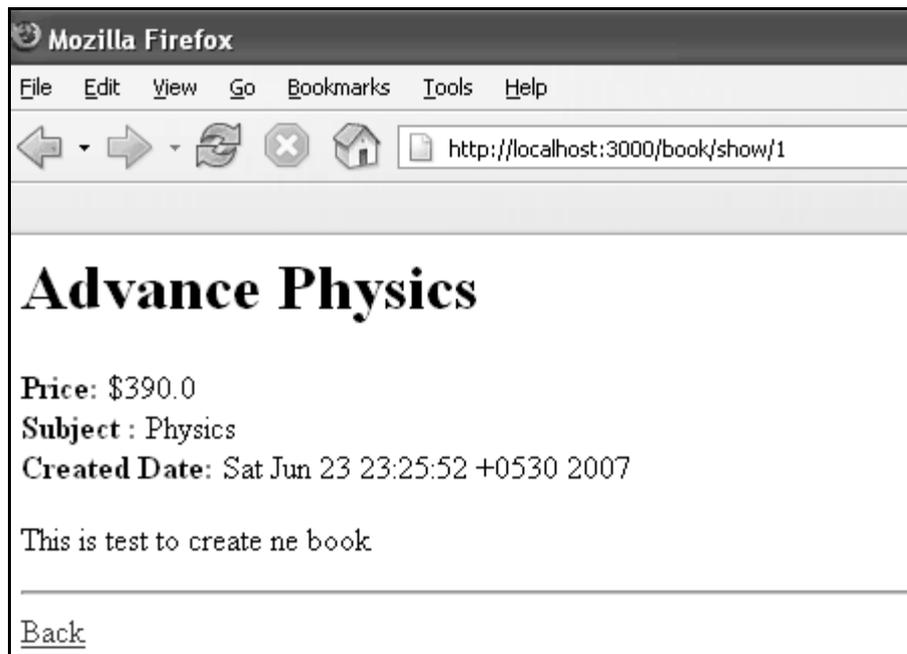
<p><%= @book.description %></p>
```

```
<hr />

<%= link_to 'Back', {:action => 'list'} %>
```

This is the first time you have taken the full advantage of associations, which enable you to easily pull data from related objects.

The format used is **@variable.relatedObject.column**. In this instance, you can pull the subject's name value through the @book variable using the **belongs_to** associations. If click on any listed record then it will show you the following screen.



Creating View File for edit Method

Create a new file called edit.html.erb and save it in app/views/book. Populate it with the following code:

```
<h1>Edit Book Detail</h1>
<%= form_for @book, :url =>{:action => "update", :id =>@book} do |f| %>
<p>Title: <%= f.text_field 'title' %></p>
<p>Price: <%= f.text_field 'price' %></p>
<p>Subject: <%= f.collection_select :subject_id, Subject.all, :id, :name %></p>
<p>Description<br/>
<%= f.text_area 'description' %></p>
<%= f.submit "Save changes" %>
<% end %>
<%= link_to 'Back', {:action => 'list' } %>
```

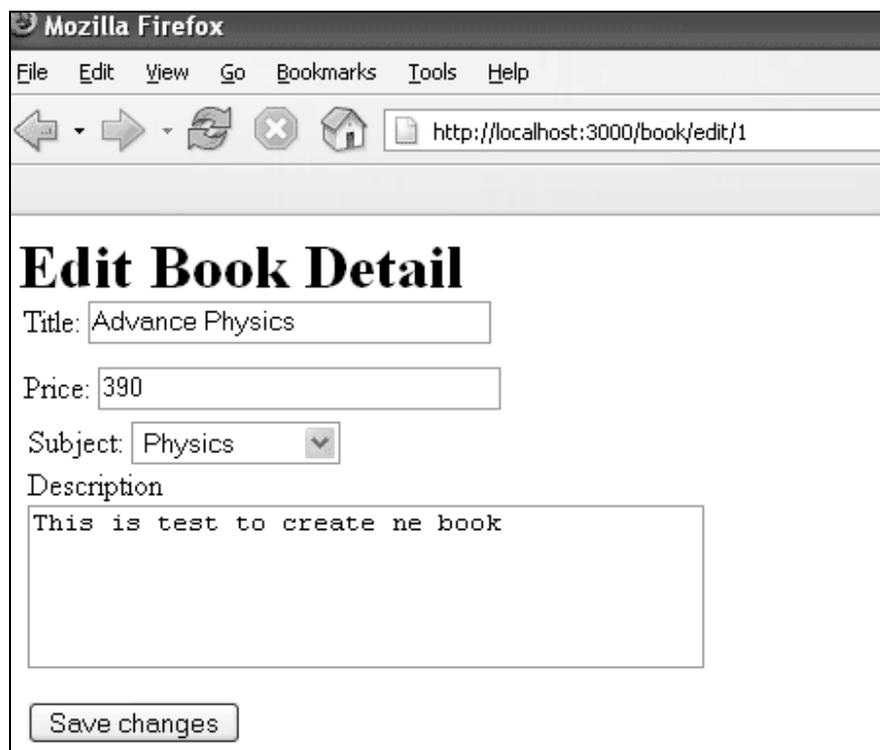
This code is very similar to the **new** method except action to be updated instead of creating and defining an id.

In this scenario, we used **form_for** tag for the form action. It will perform better than **form_tag**. Why because it will create interaction with the Model easily. Therefore it is better to use form_for tag whenever you need interaction between the model and the form fields.

At this point, we need some modification in the **list method's** view file. Go to the `` element and modify it to look like the following:

```
<li>
<%= link_to c.title, {:action => "show", :id => c.id} -%>
<b> <%= link_to 'Edit', {:action => "edit",
:id => c.id} %></b>
</li>
```

Now, try to browse books using the `http://localhost:3000/book/list`. It will give you the listing of all the books along with **Edit** option. When you click the Edit option, then you will have next screen as follows:



Now, you edit this information and then click at *Save Changes* button. This will result in a call to **update** method available in the controller file and it will update all the changed attribute. Notice that the **update** method does not need any view file because it's using either **show** or **edit** methods to show its results.

Creating View File for delete Method

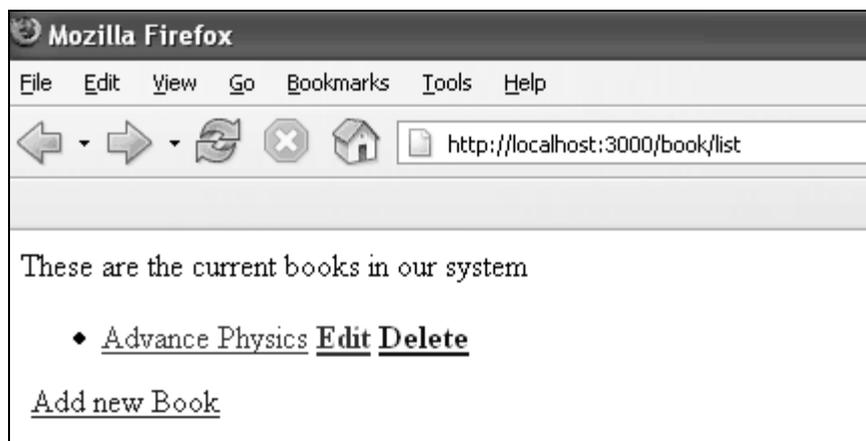
Removing information from a database using Ruby on Rails is almost too easy. You do not need to write any view code for the delete method because this method is using **list** method to display the result. So, let's just modify list.html.erb again and add a delete link.

Go to the `` element and modify it to look like the following:

```
<li>
<%= link_to c.title, {:action => 'show', :id => c.id} -%>
<b> <%= link_to 'Edit', {:action => 'edit', :id => c.id} %></b>
<b> <%= link_to "Delete", {:action => 'delete', :id => c.id},
:confirm => "Are you sure you want to delete this item?" %></b>
</li>
```

The **:confirm** parameter presents a JavaScript confirmation box asking if you really want to perform the action. If the user clicks OK, the action proceeds, and the item is deleted.

Now, try browsing books using `http://localhost:3000/book/list`. It will give you listing of all the books along with **Edit** and **Delete** options as follows:



Now using the Delete option, you can delete any listed record.

Creating View File for show_subjects Method

Create a new file, `show_subjects.html.erb`, in the `app/views/book` directory and add the following code to it:

```
<h1><%= @subject.name -%></h1>
<ul>
<% @subject.books.each do |c| %>
<li><%= link_to c.title, :action => "show", :id => c.id -%></li>
<% end %>
</ul>
```

You are taking advantage of associations by iterating through a single subject's many books listings.

Now modify the Subject: line of show.html.erb so that the subject listing shows a link.

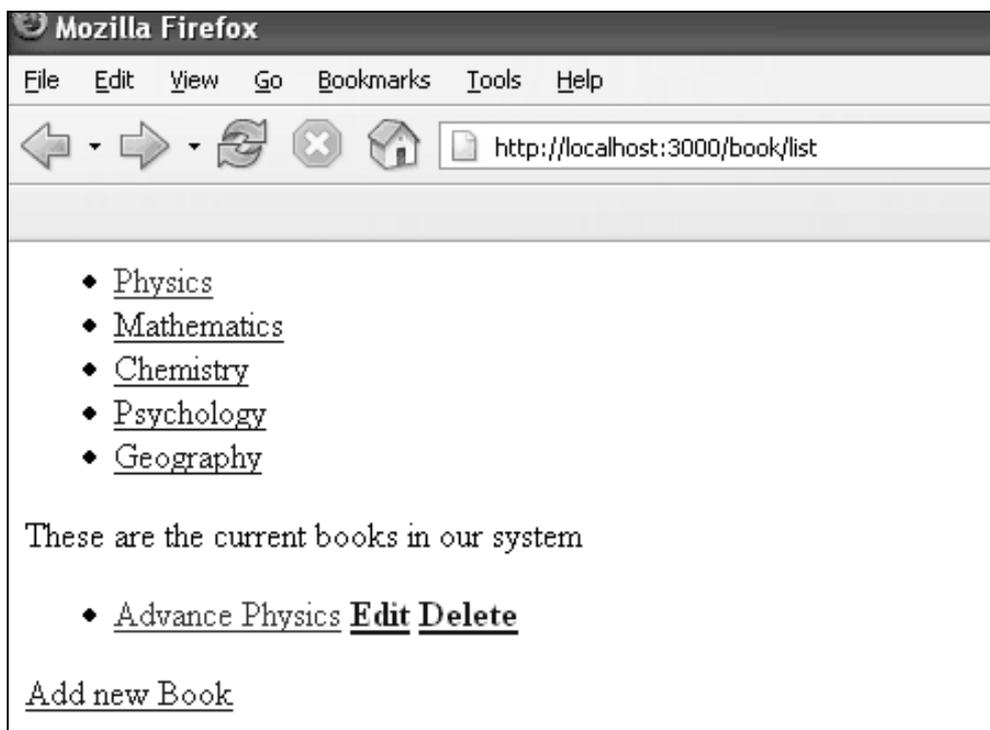
```
<strong>Subject: </strong> <%= link_to @book.subject.name,
:action => "show_subjects", :id => @book.subject.id %><br />
```

This will output a list of subject on the index page, so that users can access them directly.

Modify **list.html.erb** to add the following to the top of the file:

```
<ul id="subjects">
  <% Subject.find(:all).each do |c| %>
    <li><%= link_to c.name, :action => "show_subjects", :id => c.id %></li>
  <% end %>
</ul>
```

Now try browsing books using <http://localhost:3000/book/list>. It will display all subjects with links so that you can browse all the books related to that subject.



What is Next?

Hope now you are feeling comfortable with all the operations of Rails.

The next chapter explains how to use **Layouts** to put your data in a better way. We will show you how to use CSS in your Rails applications.

12. Ruby on Rails – Layouts

A layout defines the surroundings of an HTML page. It's the place to define a common look and feel of your final output. Layout files reside in `app/views/layouts`.

The process involves defining a layout template and then letting the controller know that it exists and to use it. First, let's create the template.

Add a new file called `standard.html.erb` to `app/views/layouts`. You let the controllers know what template to use by the name of the file, so following a same naming scheme is advised.

Add the following code to the new `standard.html.erb` file and save your changes:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html;
charset=iso-8859-1" />
<meta http-equiv="Content-Language" content="en-us" />
<title>Library Info System</title>
<%= stylesheet_link_tag "style" %>
</head>
<body id="library">
<div id="container">
<div id="header">
<h1>Library Info System</h1>
<h3>Library powered by Ruby on Rails</h3>
</div>
<div id="content">
<%= yield -%>
</div>
<div id="sidebar"></div>
</div>
</body>
</html>
```

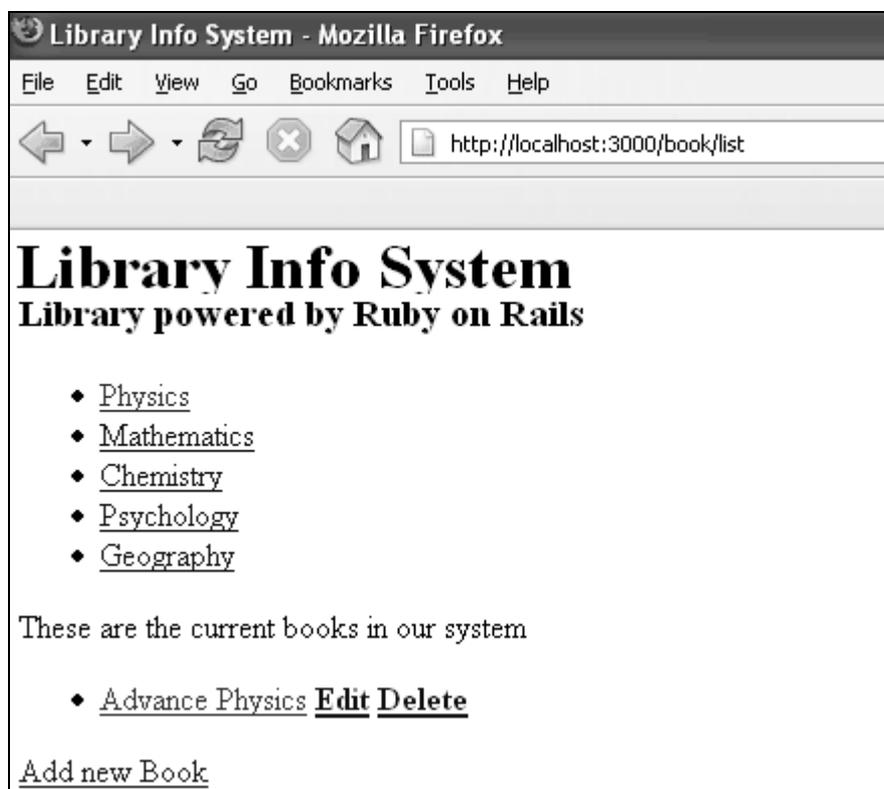
Everything you just added were standard HTML elements except two lines. The **`stylesheet_link_tag`** helper method outputs a stylesheet `<link>`. In this instance, we

are linking style.css style sheet. The **yield** command lets Rails know that it should put the RHTML for the method called here.

Now open **book_controller.rb** and add the following line just below the first line:

```
class BookController < ApplicationController
  layout 'standard'
  def list
    @books = Book.all
  end
  .....
```

It instructs the controller that we want to use a layout available in the standard.html.erb file. Now try browsing books that will produce the following screen.



Adding Style Sheet

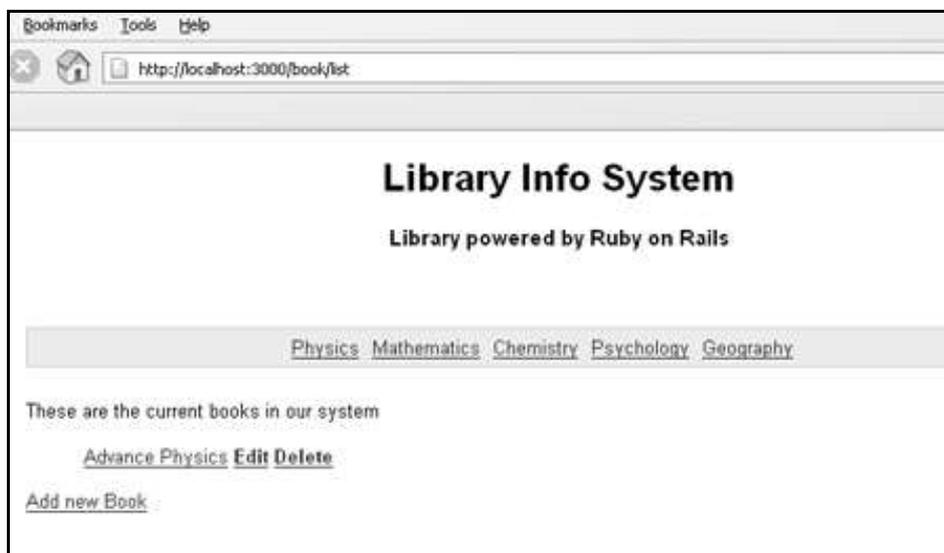
Till now, we have not created any style sheet, so Rails is using the default style sheet. Now let's create a new file called style.css and save it in /public/stylesheets. Add the following code to this file.

```
body {
  font-family: Helvetica, Geneva, Arial, sans-serif;
  font-size: small;
  font-color: #000;
```

```
background-color: #fff;
}
a:link, a:active, a:visited {
  color: #CD0000;
}
input {
  margin-bottom: 5px;
}
p {
  line-height: 150%;
}
div#container {
  width: 760px;
  margin: 0 auto;
}
div#header {
  text-align: center;
  padding-bottom: 15px;
}
div#content {
  float: left;
  width: 450px;
  padding: 10px;
}
div#content h3 {
  margin-top: 15px;
}
ul#books {
  list-style-type: none;
}
ul#books li {
  line-height: 140%;
}
div#sidebar {
  width: 200px;
  margin-left: 480px;
```

```
}  
ul#subjects {  
  width: 700px;  
  text-align: center;  
  padding: 5px;  
  background-color: #ecec;ec;  
  border: 1px solid #ccc;  
  margin-bottom: 20px;  
}  
ul#subjects li {  
  display: inline;  
  padding-left: 5px;  
}
```

Now refresh your browser and see the difference:



What is Next?

The next chapter explains how to develop applications using Rails Scaffolding to give user access to add, delete, and modify the records in any database.

13. Ruby on Rails – Scaffolding

While you're developing Rails applications, especially those which are mainly providing you with a simple interface to data in a database, it can often be useful to use the scaffold method.

Scaffolding provides more than cheap demo thrills. Here are some benefits:

- You can quickly get code in front of your users for feedback.
- You are motivated by faster success.
- You can learn how Rails works by looking at the generated code.
- You can use scaffolding as a foundation to jumpstart your development.

Scaffolding Example

To understand *scaffolding*, let's create a database called **cookbook** and a table called **recipes**.

Creating an Empty Rails Web Application

Open a command window and navigate to where you want to create this **cookbook** web application. We have used c:\ruby. So, run the following command to create a complete directory structure.

```
C:\ruby> rails cookbook
```

Setting Up the Database

Here is the way to create a database:

```
mysql> create database cookbook;
Query OK, 1 row affected (0.01 sec)

mysql> grant all privileges on cookbook.*
to 'root'@'localhost' identified by 'password';
Query OK, 0 rows affected (0.00 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)
```

To instruct Rails how to find the database, edit the configuration file `c:\ruby\cookbook\config\database.yml` and change the database name to `cookbook`. Leave the password empty. When you finish, it should look as follows:

```
development:
  adapter: mysql
  database: cookbook
  username: root
  password: [password]
  host: localhost
test:
  adapter: mysql
  database: cookbook
  username: root
  password: [password]
  host: localhost
production:
  adapter: mysql
  database: cookbook
  username: root
  password: [password]
  host: localhost
```

Rails lets you run in the development mode, test mode, or production mode, using different databases. This application uses the same database for each.

The Generated Scaffold Code

With the scaffold action, Rails generates all the code it needs dynamically. By running *scaffold* as a script, we can get all the code written to disk, where we can investigate it and then start tailoring it to our requirements.

So now, let's start once again to generate Scaffold code manually by using the scaffold helper script:

```
cookbook> rails generate scaffold recipe
```

It generates auto-files as shown below

```

invoke active_record
create db/migrate/20150707112642_create_recipes.rb
create app/models/recipe.rb
invoke test_unit
create test/models/recipe_test.rb
create test/fixtures/recipes.yml
invoke resource_route
route resources :recipes
invoke scaffold_controller
create app/controllers/recipes_controller.rb
invoke erb
create app/views/recipes
create app/views/recipes/index.html.erb
create app/views/recipes/edit.html.erb
create app/views/recipes/show.html.erb
create app/views/recipes/new.html.erb
create app/views/recipes/_form.html.erb
invoke test_unit
create test/controllers/recipes_controller_test.rb
invoke helper
create app/helpers/recipes_helper.rb
invoke test_unit
invoke jbuilder
create app/views/recipes/index.json.jbuilder
create app/views/recipes/show.json.jbuilder
invoke assets
invoke coffee
create app/assets/javascripts/recipes.coffee
invoke scss
create app/assets/stylesheets/recipes.scss
invoke scss
create app/assets/stylesheets/scaffolds.scss

```

The Controller

Let's look at the code behind the controller. This code is generated by the **scaffold** generator. If you open `app/controllers/recipes_controller.rb`, then you will find something as follows:

```

class RecipesController < ApplicationController
  before_action :set_recipe, only: [:show, :edit, :update, :destroy]

  # GET /recipes
  # GET /recipes.json
  def index
    @recipes = Recipe.all
  end
end

```

```
# GET /recipes/1
# GET /recipes/1.json
def show
end

# GET /recipes/new
def new
  @recipe = Recipe.new
end

# GET /recipes/1/edit
def edit
end

# POST /recipes
# POST /recipes.json
def create
  @recipe = Recipe.new(recipe_params)

  respond_to do |format|
    if @recipe.save
      format.html { redirect_to @recipe, notice: 'Recipe was successfully
created.' }
      format.json { render :show, status: :created, location: @recipe }
    else
      format.html { render :new }
      format.json { render json: @recipe.errors, status:
:unprocessable_entity }
    end
  end
end

# PATCH/PUT /recipes/1
# PATCH/PUT /recipes/1.json
def update
  respond_to do |format|
    if @recipe.update(recipe_params)
```

```
        format.html { redirect_to @recipe, notice: 'Recipe was successfully
updated.' }

        format.json { render :show, status: :ok, location: @recipe }
    else
        format.html { render :edit }
        format.json { render json: @recipe.errors, status:
:unprocessable_entity }
    end
end
end

# DELETE /recipes/1
# DELETE /recipes/1.json
def destroy
    @recipe.destroy
    respond_to do |format|
        format.html { redirect_to recipes_url, notice: 'Recipe was successfully
destroyed.' }
        format.json { head :no_content }
    end
end

private
# Use callbacks to share common setup or constraints between actions.
def set_recipe
    @recipe = Recipe.find(params[:id])
end

# Never trust parameters from the scary internet, only allow the white list
through.
def recipe_params
    params.require(:recipe).permit(:tittle, :instructions)
end
end
```

When the user of a Rails application selects an action, e.g. "Show" - the controller will execute any code in the appropriate section - "def show" - and then by default will render a template of the same name - "show.html.erb". This default behavior can be overwritten.

The controller uses ActiveRecord methods such as `find`, `find_all`, `new`, `save`, `update_attributes`, and `destroy` to move data to and from the database tables. Note that you do not have to write any SQL statements, rails will take care of it automatically.

This single line of code will bring the database table to life. It will provide with a simple interface to your data, and ways of:

- Creating new entries
- Editing current entries
- Viewing current entries
- Destroying current entries

When creating or editing an entry, scaffold will do all the hard work like form generation and handling for you, and will even provide clever form generation, supporting the following types of inputs:

- Simple text strings
- Text areas (or large blocks of text)
- Date selectors
- Date-time selectors

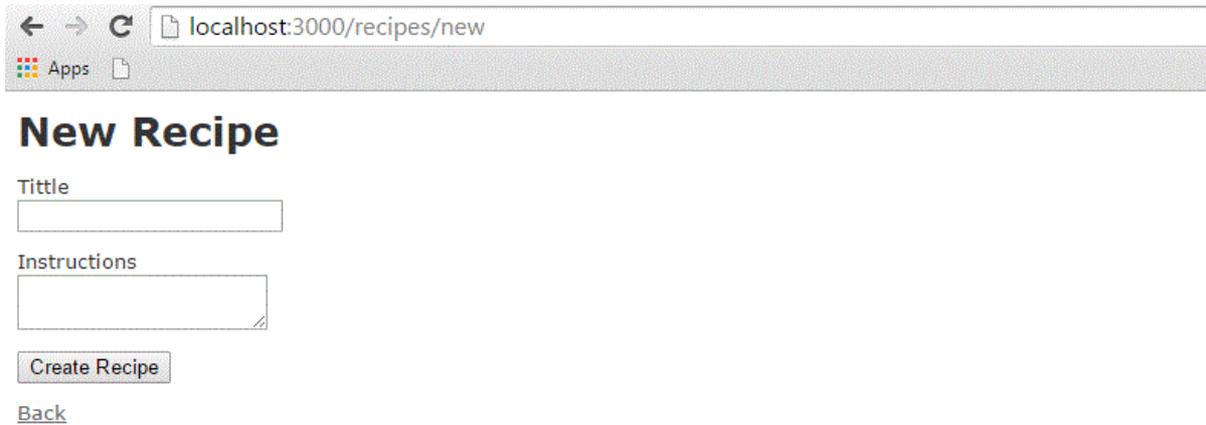
You can use Rails Migrations to create and maintain tables.

```
rake db:migrate RAILS_ENV=development
```

Now, go to the cookbook directory and run the Web Server using the following command:

```
cookbook> rails server
```

Now, open a browser and navigate to <http://127.0.0.1:3000/recipe/new>. This will provide you a screen to create new entries in the recipes table. A screenshot is shown below:



← → ↻ localhost:3000/recipes/new

Apps

New Recipe

Title

Instructions

Create Recipe

[Back](#)

Once you press the **Create** button to create a new recipe, your record is added into the recipes table and it shows the following result:



← → ↻ localhost:3000/recipes/1

Apps

Recipe was successfully created.

Title: chicken

Instructions: nice one

[Edit](#) | [Back](#)

You can see the option to edit, show, and destroy the records. So, play around with these options.

You can also list down all the recipes available in the recipes table using the URL <http://127.0.0.1:3000/recipe/list>.

Enhancing the Model

Rails gives you a lot of error handling for free. To understand this, add some validation rules to the empty recipe model:

Modify `app/models/recipe.rb` as follows and then test your application:

```
class Recipe < ActiveRecord::Base
  validates_length_of :title, :within => 1..20
  validates_uniqueness_of :title, :message => "already exists"
end
```

These entries will give automatic checking.

- **validates_length_of** - the field is not blank and not too long.
- **validates_uniqueness_of** - duplicate values are trapped. Instead of the default Rails error message, we have given a custom message here.

Alternative Way to Create Scaffolding

Create an application as shown above and **The Generated Scaffold Code** as shown below

```
rails g scaffold Recipe tittle:string instructions:text
```

Above code generates the auto files with data base by using with sqlite3 with tittle and instruction column as shown below an image.

```
invoke active_record
create db/migrate/20150707112642_create_recipes.rb
create app/models/recipe.rb
invoke test_unit
create test/models/recipe_test.rb
create test/fixtures/recipes.yml
invoke resource_route
route resources :recipes
invoke scaffold_controller
create app/controllers/recipes_controller.rb
invoke erb
create app/views/recipes
create app/views/recipes/index.html.erb
create app/views/recipes/edit.html.erb
create app/views/recipes/show.html.erb
create app/views/recipes/new.html.erb
create app/views/recipes/_form.html.erb
invoke test_unit
create test/controllers/recipes_controller_test.rb
invoke helper
create app/helpers/recipes_helper.rb
invoke test_unit
invoke jbuilder
create app/views/recipes/index.json.jbuilder
create app/views/recipes/show.json.jbuilder
invoke assets
invoke coffee
create app/assets/javascripts/recipes.coffee
invoke scss
create app/assets/stylesheets/recipes.scss
invoke scss
create app/assets/stylesheets/scaffolds.scss
```

We need to migrate the data base by using below syntax

```
$ rake db:migrate RAILS_ENV=development
```

Finally run the application by using the following command line:

```
rails server
```

It will generate the result as shown above output images.

The Views

All the views and corresponding all the controller methods are created by **scaffold** command and they are available in the app/views/recipes directory.

How Scaffolding is Different?

If you have gone through the previous chapters, then you must have seen that we had created methods to list, show, delete and create data etc., but scaffolding does that job automatically.

14. Ruby on Rails – Ajax on Rails

Ajax stands for **A**synchronous **J**avaScript and **X**ML. Ajax is not a single technology; it is a suite of several technologies. Ajax incorporates the following:

- XHTML for the markup of web pages
- CSS for the styling
- Dynamic display and interaction using the DOM
- Data manipulation and interchange using XML
- Data retrieval using XMLHttpRequest
- JavaScript as the glue that meshes all this together

Ajax enables you to retrieve data for a web page without having to refresh the contents of the entire page. In the basic web architecture, the user clicks a link or submits a form. The form is submitted to the server, which then sends back a response. The response is then displayed for the user on a new page.

When you interact with an Ajax-powered web page, it loads an Ajax engine in the background. The engine is written in JavaScript and its responsibility is to both communicate with the web server and display the results to the user. When you submit data using an Ajax-powered form, the server returns an HTML fragment that contains the server's response and displays only the data that is new or changed as opposed to refreshing the entire page.

For a complete detail on AJAX you can go through our AJAX Tutorial

How Rails Implements Ajax

Rails has a simple, consistent model for how it implements Ajax operations. Once the browser has rendered and displayed the initial web page, different user actions cause it to display a new web page (like any traditional web application) or trigger an Ajax operation:

- **Some trigger fires:** This trigger could be the user clicking on a button or link, the user making changes to the data on a form or in a field, or just a periodic trigger (based on a timer).
- **The web client calls the server:** A JavaScript method, *XMLHttpRequest*, sends data associated with the trigger to an action handler on the server. The data might be the ID of a checkbox, the text in an entry field, or a whole form.
- **The server does processing:** The server-side action handler (Rails controller action) does something with the data and returns an HTML fragment to the web client.
- **The client receives the response:** The client-side JavaScript, which Rails creates automatically, receives the HTML fragment and uses it to update a specified part of the current page's HTML, often the content of a <div> tag.

These steps are the simplest way to use Ajax in a Rails application, but with a little extra work, you can have the server return any kind of data in response to an Ajax request, and you can create custom JavaScript in the browser to perform more involved interactions.

AJAX Example

While discussing rest of the Rails concepts, we have taken an example of Library. There we have a table called **subject** and we have added few subjects at the time of Migration. Till now, we have not provided any procedure to add and delete subjects in this table.

In this example, we will provide, list, show, and create operations on subject table. If you don't have any understanding on Library Info System explained in the previous chapters, then we would suggest you to go through the previous chapters first and then continue with AJAX on Rails.

Creating an Application

Let us start with the creation of an application. It will be done as follows:

```
rails new ponies
```

The above command creates an application, now we need to call the app directory using with cd command. It will enter in to an application directory then we need to call a scaffold command. It will be done as follows

```
rails generate scaffold Pony name:string profession:string
```

The above command generates the scaffold with name and profession column. We need to migrate the data base as follows command

```
rake db:migrate
```

Now Run the Rails application as follows command

```
rails s
```

Now open the web browser and call a url as <http://localhost:3000/ponies/new>, The output will be as follows

localhost:3000/ponies/new

New Pony

Name

Profession

[Back](#)

Creating an Ajax

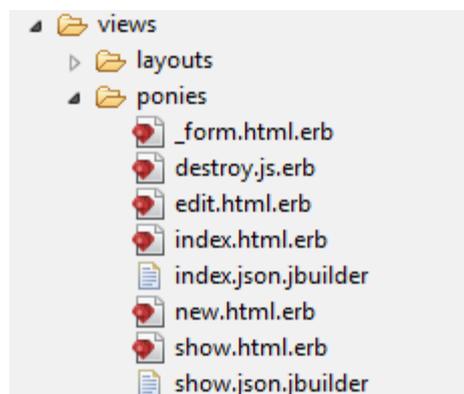
Now open `app/views/ponies/index.html.erb` with suitable text editors. Update your destroy line with `:remote => true`, `:class => 'delete_pony'`. At finally, it looks like as follows

```

9      <th>Profession</th>
10     <th colspan="3"></th>
11   </tr>
12 </thead>
13
14 <tbody>
15   <%= @ponies.each do |pony| %>
16     <tr>
17       <td><%= pony.name %></td>
18       <td><%= pony.profession %></td>
19       <td><%= link_to 'Show', pony %></td>
20       <td><%= link_to 'Edit', edit_pony_path(pony) %></td>
21       <td><%= link_to 'Destroy', pony, method: :delete, data: { confirm: 'Are you sure?' },
22         :remote => true, :class => 'delete_pony' %></td>
23     </tr>
24   <%= end %>
25 </tbody>
26 </table>
27
28 <br>
29
30 <%= link_to 'New Pony', new_pony_path %>

```

Create a file, `destroy.js.erb`, put it next to your other `.erb` files (under `app/views/ponies`). It should look like this:



Now enter the code as shown below in destroy.js.erb

```
$('.delete_pony').bind('ajax:success', function() {
    $(this).closest('tr').fadeOut();
});
```

Now Open your controller file which is placed at app/controllers/ponies_controller.rb and add the following code in destroy method as shown below

```
# DELETE /ponies/1
# DELETE /ponies/1.json
def destroy
  @pony = Pony.find(params[:id])
  @pony.destroy

  respond_to do |format|
    format.html { redirect_to ponies_url }
    format.json { head :no_content }
    format.js   { render :layout => false }
  end
end
```

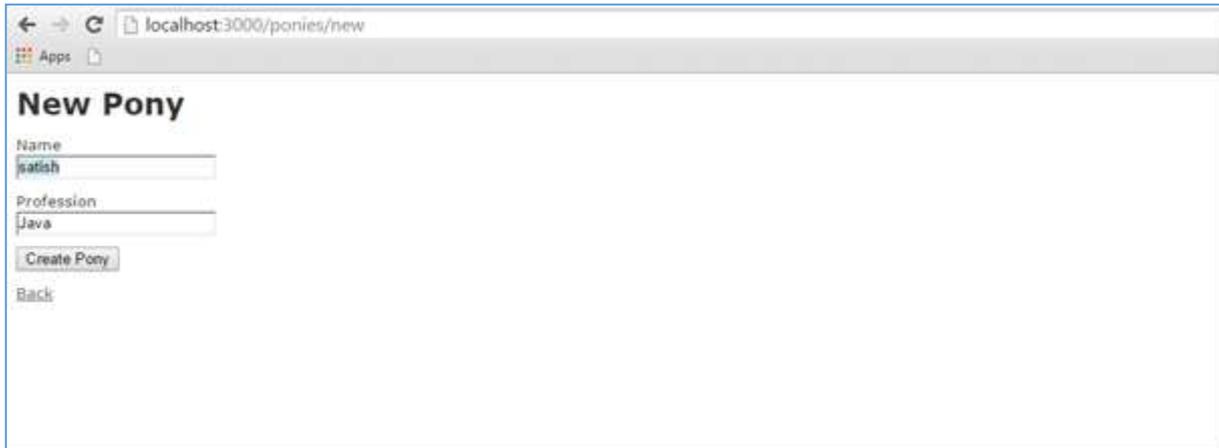
At finally controller page is as shown image.

```
_controller.rb ×
  else
    format.html { render :edit }
    format.json { render json: @pony.errors, status: :unprocessable_entity }
  end
end
end
end

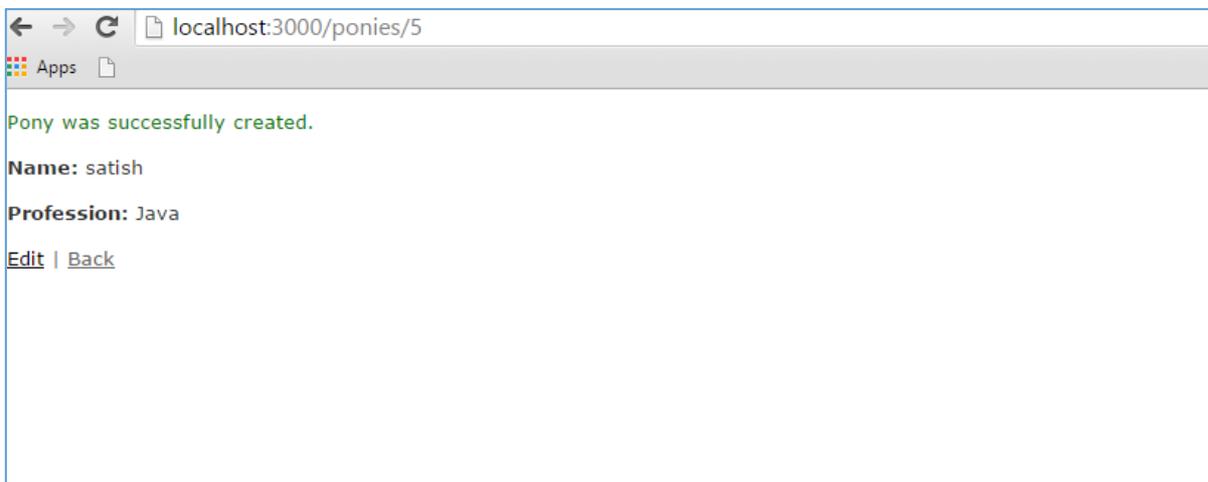
DELETE /ponies/1
DELETE /ponies/1.json
def destroy
  @pony.destroy
  respond_to do |format|
    format.html { redirect_to ponies_url, notice: 'Pony was successfully destroyed.' }
    format.json { head :no_content }
    format.js   { render :layout => false }
  end
end
end

private
# Use callbacks to share common setup or constraints between actions.
def set_pony
  @pony = Pony.find(params[:id])
end
```

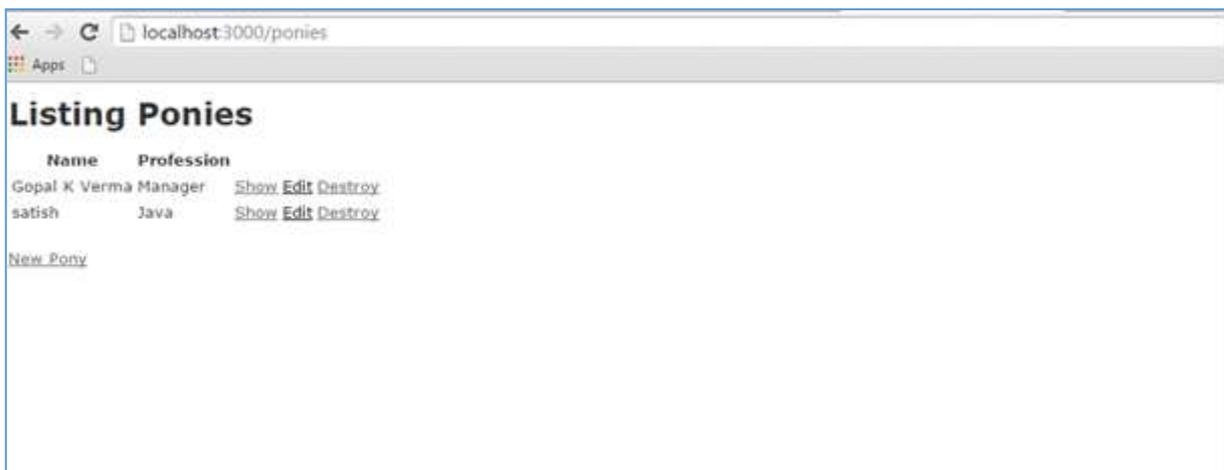
Now run an application, Output called from <http://localhost:3000/ponies/new>, it will look like as following image



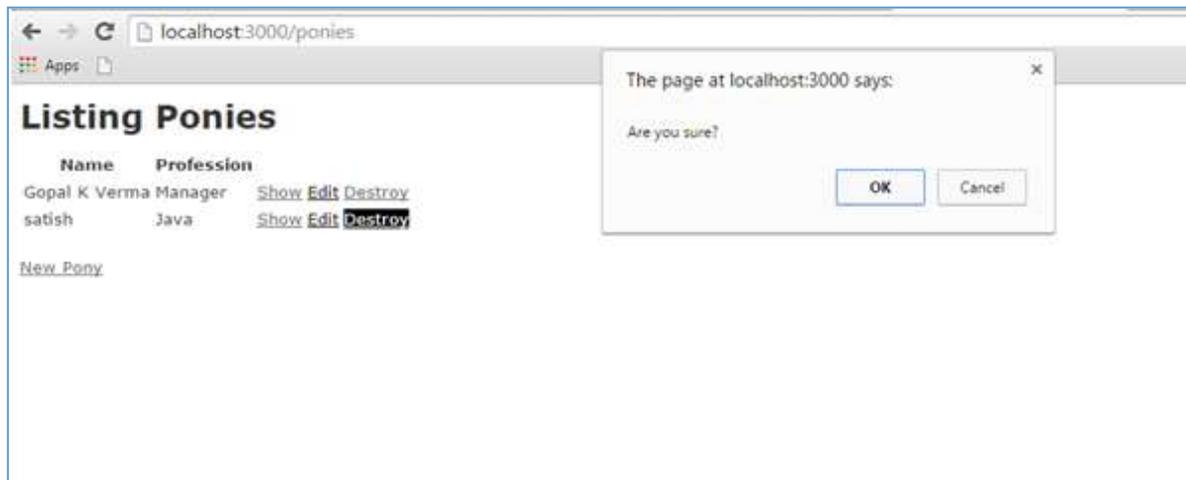
Press on create pony button, it will generate the result as follows



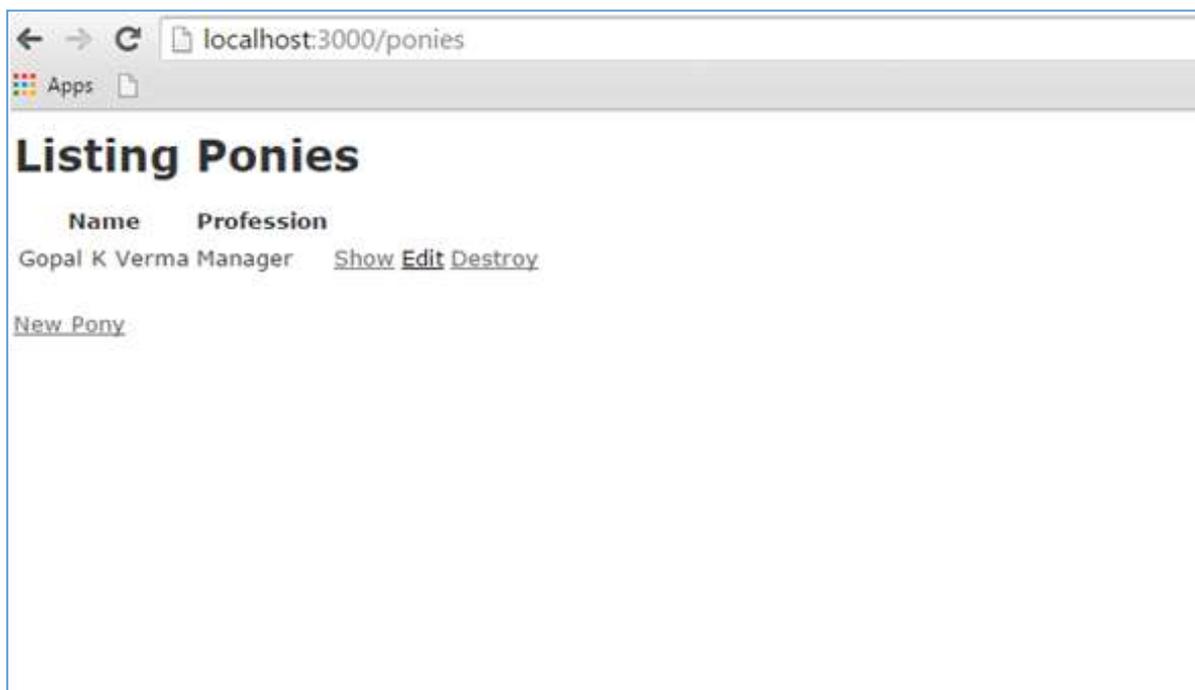
Now click on back button, it will show all pony created information as shown image



Till now, we are working on scaffold, now click on destroy button, it will call a pop-up as shown below image, the pop-up works based on Ajax.



If Click on ok button, it will delete the record from pony. Here I have clicked ok button. Final output will be as follows



15. Ruby on Rails – File Uploading

You may have a requirement in which you want your site visitors to upload a file on your server. Rails makes it very easy to handle this requirement. Now we will proceed with a simple and small Rails project.

As usual, let's start off with a new Rails application called **testfile**. Let's create the basic structure of the application by using simple rails command.

```
tp> rails new testfile
```

Before starting application development, we should install gem files as shown below:

```
gem install carrierwave  
gem install bootstrap-sass
```

Open up your gemfile and add the following two gems at the bottom as shown in the following image:

```
42  
43 # windows does not include zoneinfo files, so bundle the tzinfo-data gem  
44 gem 'tzinfo-data', platforms: [:mingw, :mswin, :x64_mingw, :jruby]  
45  
46 gem 'carrierwave', '~> 0.9'  
47 gem 'bootstrap-sass', '~> 2.3.2'
```

After adding gems in the gem file, we need to run the following command on the console:

```
bundle install
```

Creating the Model

We need to create a model with two strings as name and attachment as shown below:

```
rails g model Resume name:string attachment:string
```

We need to create the database migration as shown below:

```
rake db:migrate
```

We need to generate the controller as shown below:

```
rails g controller Resumes index new create destroy
```

Great! Now we have the basic structure set up. Now we need to create an uploader. An Uploader came from carrierwave gem and it tells to carrierwave how to handle the files. In short, it contained all file processing functionalities. Run the command to create an uploader as shown below

```
rails g uploader attachment
```

Now open the resume model and call the uploader as shown below. Resume model has placed at app/models/resume.rb:

```
class Resume < ActiveRecord::Base
  mount_uploader :attachment, AttachmentUploader # Tells rails to use this
  uploader for this model.
  validates :name, presence: true # Make sure the owner's name is present.
end
```

Before working on controller, we need to modify our config/routes.rb as shown below

```
CarrierWaveExample::Application.routes.draw do
  resources :resumes, only: [:index, :new, :create, :destroy]
  root "resumes#index"
end
```

Let us edit the controller as shown below.

```
class ResumesController < ApplicationController
  def index
    @resumes = Resume.all
  end

  def new
    @resume = Resume.new
  end

  def create
    @resume = Resume.new(resume_params)

    if @resume.save
      redirect_to resumes_path, notice: "The resume #{@resume.name} has been
      uploaded."
    else
      render "new"
    end
  end

  def destroy
```

```

    @resume = Resume.find(params[:id])
    @resume.destroy

    redirect_to resumes_path, notice: "The resume #{@resume.name} has been
deleted."
end

private

def resume_params
  params.require(:resume).permit(:name, :attachment)
end

end

```

Let's add bootstrap implementation in css file.css file could be in app/assets/stylesheets/resumes.css.scss

```
@import "bootstrap";
```

Now open up app/views/layouts/application.html.erb and add codes as shown below

```

<!DOCTYPE html>
<html>
<head>
  <title>Tutorialspoint</title>
  <%= stylesheet_link_tag "application", media: "all", "data-turbolinks-
track" => true %>
  <%= javascript_include_tag "application", "data-turbolinks-track" => true %>
  <%= csrf_meta_tags %>
</head>
<body>
<div class="container" style="padding-top:20px;">
<%= yield %>
</div>
</body>
</html>

```

Now we need to set up index views as shown below:

```

<% if !flash[:notice].blank? %>
  <div class="alert alert-info">
    <%= flash[:notice] %>

```

```

    </div>
<% end %>
<br />
<%= link_to "New Resume", new_resume_path, class: "btn btn-primary" %>
<br />
<br />
<table class="table table-bordered table-striped">
  <thead>
    <tr>
      <th>Name</th>
      <th>Download Link</th>
      <th> </th>
    </tr>
  </thead>
  <tbody>
    <% @resumes.each do |resume| %>
      <tr>
        <td><%= resume.name %></td>
        <td><%= link_to "Download Resume", resume.attachment_url %></td>
        <td><%= button_to "Delete", resume, method: :delete, class: "btn btn-danger", confirm: "Are you sure that you wish to delete #{resume.name}?" %></td>
      </tr>
    <% end %>
  </tbody>
</table>

```

Now, let us edit new.html.erb and add our form code.

```

<% if !@resume.errors.empty? %>
  <div class="alert alert-error">
    <ul>
      <% @resume.errors.full_messages.each do |msg| %>
        <li><%= msg %></li>
      <% end %>
    </ul>
  </div>
<% end %>

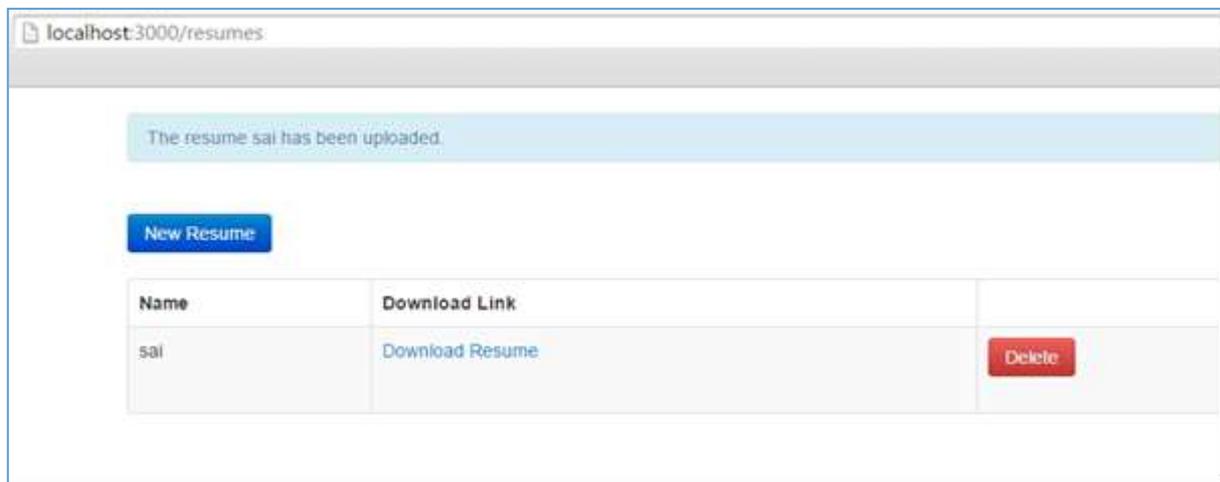
```

```

<div class="well">
  <%= form_for @resume, html: { multipart: true } do |f| %>
    <%= f.label :name %>
    <%= f.text_field :name %>
    <%= f.label :attachment %>
    <%= f.file_field :attachment %>
    <%= f.submit "Save", class: "btn btn-primary" %>
  <% end %>
</div>

```

Now start the server and visit <http://localhost:3000>. It will produce a screen similar to as follows:



One last thing we need to do is filter the list of allowed filetypes. For that we need add simple code as shown below at app/uploaders/attachment_uploader.rb

```

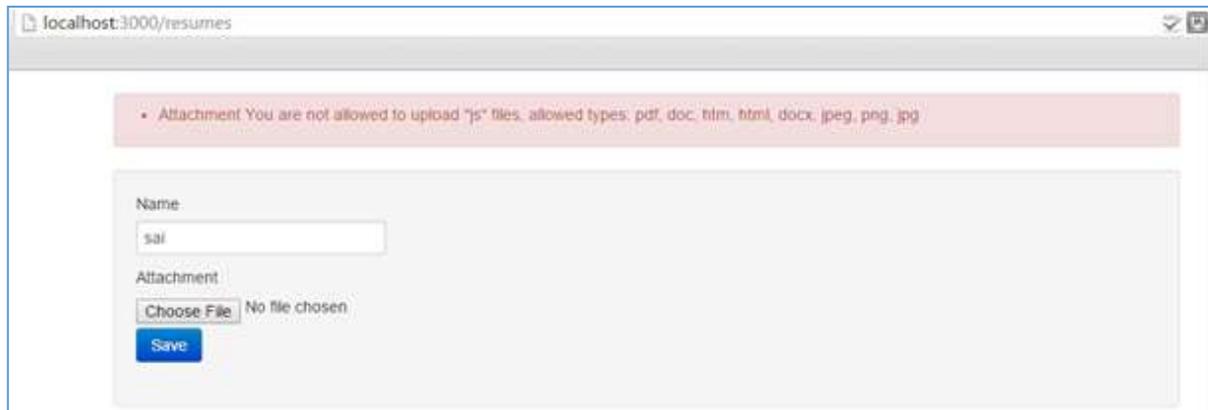
class AttachmentUploader < CarrierWave::Uploader::Base
  storage :file

  def store_dir
    "uploads/#{model.class.to_s.underscore}/#{mounted_as}/#{model.id}"
  end

  def extension_white_list
    %w(pdf doc htm html docx)
  end
end

```

Now start the server and visit <http://localhost:3000>. Now input a wrong format; it will generate a wrong message as shown below:



For a complete detail on **File** object, you need to go through the **Ruby Reference Manual**.

16. Ruby on Rails – Send Email

Action Mailer is the Rails component that enables applications to send and receive emails. In this chapter, we will see how to send an email using Rails. Let's start creating an **emails** project using the following command.

```
> rails emails
```

This will create the required framework to proceed. Now, we will start with configuring the ActionMailer.

Action Mailer - Configuration

Following are the steps you have to follow to complete your configuration before proceeding with the actual work:

Go to the config folder of your emails project and open **environment.rb** file and add the following line at the bottom of this file.

```
config.action_mailer.delivery_method = :smtp
```

It tells ActionMailer that you want to use the SMTP server. You can also set it to be :sendmail if you are using a Unix-based operating system such as Mac OS X or Linux.

Add the following lines of code at the bottom of your environment.rb as well.

```
config.action_mailer.smtp_settings = {  
  address:          'smtp.gmail.com',  
  port:             587,  
  domain:           'example.com',  
  user_name:        '<username>',  
  password:         '<password>',  
  authentication:   'plain',  
  enable_starttls_auto: true }  
}
```

Replace each hash value with proper settings for your Simple Mail Transfer Protocol (SMTP) server. You can take this information from your Internet Service Provider if you already don't know. You don't need to change port number 25 and authentication type if you are using a standard SMTP server.

You may also change the default email message format. If you prefer to send email in HTML instead of plain text format, add the following line to config/environment.rb as well:

```
ActionMailer::Base.default_content_type = "text/html"
```

ActionMailer::Base.default_content_type could be set to "text/plain", "text/html", and "text/enriched". The default value is "text/plain".

The next step will be to create a mailer.

Generate a Mailer

Use the following command to generate a mailer as follows:

```
tp> cd emails
emails> rails generate mailer Usermailer
```

This will create a file user_mailer.rb in the app\mailer directory. Check the content of this file as follows:

```
class Emailer < ActionMailer::Base
end
```

Let's create one method as follows:

```
class UserMailer < ApplicationMailer
  default from: 'notifications@example.com'

  def welcome_email(user)
    @user = user
    @url = 'http://www.gmail.com'
    mail(to: @user.email, subject: 'Welcome to My Awesome Site')
  end
end
```

- **default Hash** - This is a hash of default values for any email you send from this mailer. In this case we are setting the :from header to a value for all messages in this class. This can be overridden on a per-email basis.
- **mail** - The actual email message, we are passing the :to and :subject headers in.

Create a file called welcome_email.html.erb in app/views/user_mailer/. This will be the template used for the email, formatted in HTML:

```
<html>
  <head>
    <meta content='text/html; charset=UTF-8' http-equiv='Content-Type' />
  </head>
  <body>
    <h1>Welcome to example.com, <%= @user.name %></h1>
    <p>
```

```

    You have successfully signed up to example.com,
    your username is: <%= @user.login %>.<br>
</p>
<p>
    To login to the site, just follow this link: <%= @url %>.
</p>
<p>Thanks for joining and have a great day!</p>
</body>
</html>

```

Next we will create a text part for this application as follow

```

Welcome to example.com, <%= @user.name %>
=====

You have successfully signed up to example.com,
your username is: <%= @user.login %>.

To login to the site, just follow this link: <%= @url %>.

Thanks for joining and have a great day!

```

Calling the Mailer

First, let's create a simple User scaffold

```

$ bin/rails generate scaffold user name email login
$ bin/rake db:migrate

```

Action Mailer is nicely integrated with Active Job so you can send emails outside of the request-response cycle, so the user doesn't have to wait on it:

```

class UsersController < ApplicationController
  # POST /users
  # POST /users.json
  def create
    @user = User.new(params[:user])

    respond_to do |format|
      if @user.save

```

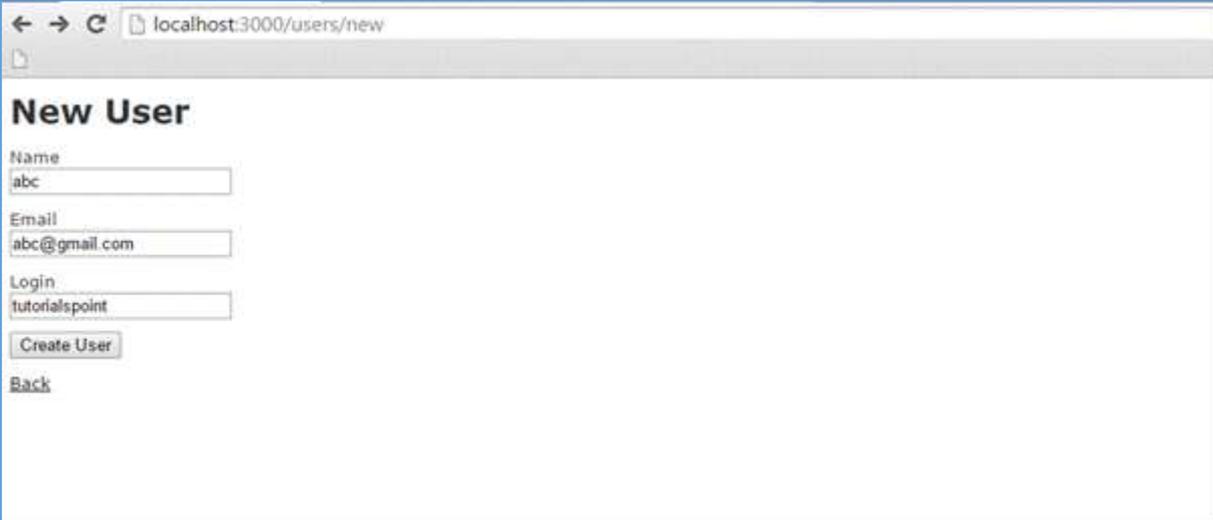
```

    # Tell the UserMailer to send a welcome email after save
    UserMailer.welcome_email(@user).deliver_later

    format.html { redirect_to(@user, notice: 'User was successfully
created.')} }
    format.json { render json: @user, status: :created, location: @user }
  else
    format.html { render action: 'new' }
    format.json { render json: @user.errors, status: :unprocessable_entity
}
  end
end
end
end
end

```

Now, test your application by using <http://127.0.0.1:3000/users/new>. It displays the following screen and by using this screen, you will be able to send your message to anybody.



The screenshot shows a web browser window with the address bar displaying 'localhost:3000/users/new'. The page title is 'New User'. The form contains three input fields: 'Name' with the value 'abc', 'Email' with the value 'abc@gmail.com', and 'Login' with the value 'tutorialspoint'. Below the fields is a 'Create User' button and a 'Back' link.

This will send your message and will display the text message "Message sent successfully" and output as follow

```

sent mail to kittuprasad700@gmail.com (2023.Sms)
[ActiveJob] [ActionMailer::DeliveryJob] [2cfde3c-260e-4a33-1a6ada13a9b] Date:
Thu, 09 Jul 2015 11:44:05 +0530
From: notification@example.com
To: kittuprasad700@gmail.com
Message-Id: <559e112d63c57_f1031e7f23467@kiranPro.mail>
Subject: Welcome to My Awesome Site

```

```
Mime-Version: 1.0
Content-Type: multipart/alternative;
boundary="--mimepart_559e112d601c8_f1031e7f20233f5";
charset=UTF-8
Content-Transfer-Encoding:7bit
```

For more information on how to send emails using Rails, please go through [ActionMailer](#).